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NOTICES OF THE REPORT OF THE SANITARY COMMISSION.

The following message from his Honor, the Mayor was read, and, on motion, it was referred to the Committee on Health.

Mayorality of New Orleans,
City Hall, December 12, 1854.

To the President and Members of the Common Council:

Gentlemen:—I herewith present the report of the Sanitary Commission appointed by the City council, to investigate the origin and mode of transmission of the great epidemic fever of last year, together with all causes affecting the salubrity of the city.

It is with feelings of just pride that I call your attention to this voluminous record of the labors of the Commission, which does nearly as much honor to the city's liberality as to the gentlemen composing it, being the first of its kind in this country.

No subject affecting these important relations has been left unexamined. These researches have extended back to the first origin of the great enemy of our prosperity (yellow fever) among us, and each year of its progress and causation traced to the present time, embracing, it is believed, nearly every record of value. No less minute have been the details of remedies to meet the conditions pointed out; and it is most gratifying to me to say to you that, although our condition has subjected us to calamitous visitations of disease, it is the unanimous opinion of the scientific and intelligent gentlemen composing that Commission, that it is entirely removable, and that as bountiful a store of health can be enjoyed here as in any large city of our Union, if the proper steps are taken to insure it. These are specially pointed out. The project of a Health Department is given as the organ to carry out these views, and to this subject I particularly invite your earliest attention. No large city is without a Board of Health of some kind; no city suffers so much for the want of one as this. We have had occasional boards, without much power, and but of very transient duration, for some thirty years back. It is full time something permanent was organized, for its important bearing upon our sanitary condition, and to remove the reproach of carelessness and recklessness to which we have been so long subject in relation to health and life.

There is another reason for immediate action, which a cursory examination of this valuable work will suggest to you. Many of our public works of the greatest moment to us can only be carried on with safety to the public health during the cool months, which are already fast passing away.

And again, the subject of quarantine, so deeply interesting to the public, I am pleased to find this Commission reporting upon with entire unanimity, and taking the only rational ground, that, while it is not recommended as a substitute for sanitary measures, it should be enforced only upon unsound subjects and filth-vessels. This, I am sure, will entirely fulfil the public wants and meet public expectation, without placing any unnecessary restriction upon commerce.

There is an urgent demand at this moment for the action of such a Board. Vessels are constantly arriving here requiring their instant surveillance and attention, with authority to make such temporary arrangements, for a quarantine establishment, as may supply the present necessities, until the Legislature (soon to convene,) shall make such appropriations as will put it upon a permanent footing.

No great improvement, affecting our sanitary relations, can be expected, without attendant expenses. These are necessarily incidental to all benefits ; they are, as it were, its price ; a full organization of a Health Department will probably cost, the first year, near $20,000, and during subsequent years about two-thirds of that sum. It may, and probably would save, directly and indirectly, millions to this city ; remove her reputation for perennial insalubrity, now retarding her prosperity, preventing immigration, and enhancing the price of every marketable commodity.

The improvements required in the opinion of the commission, to produce this invaluable change in our sanitary condition, are recommended to be met by sources of revenue and means entirely independent of any additional burthen on our tax ridden community, and are highly worthy of your most serious consideration.

In addition to these, I would take the liberty of suggesting, that as the canal of the Canal Bank, will soon become the property of the State, by expiration of its chartered privileges, an early application should be made to the Legislature for the transfer of the State's rights to the city, that a credit may be predicated upon its value or income, and appropriated to the purpose of our sanitary condition.

With the developments made in this report, taken in connection with our great railroad improvements, it is clear to my mind that we have arrived at an era of the most critical magnitude to our city. With the adoption of both, now clearly demonstrated to be within our reach, there can be no limit to our advancement, and we shall be enabled to realize all the fond anticipations of our true-hearted citizens.

Very respectfully,
JOHN L. LEWIS, Mayor.

Extract from letters from Prof. Chas. A. Lee, Bowdoin College, Maine.

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"I hardly know how to express my thanks to you, or the importance which I attach to your labors. That you have made the most important additions to sanitary science, as influenced by meteorological or climatic causes, yet given to the world, is beyond all question in my mind. I am amazed at the amount of labor you have found time to expend on this work. You have grappled with all the elements which enter into the causation of epidemic and endemic diseases, and you have demonstrated and developed them with the hand of a master. Your conclusions are irrefutable, because they are logically deduced from the facts and reasoning presented. You have succeeded in elucidating mysteries which have never before been unravelled. You have cleared up difficulties which have been a stumbling block to all preceding writers. You have been able to demonstrate what I have theoretically held for twenty years—that the hygrometical state of the atmosphere is one of the essential conditions for the prevalence and existence of epidemic and endemic diseases. You are aware that I stated this in Forry's Work on Climate and in the Boston Medical and Surgical Journal, some fifteen years ago. But I have never been able to demonstrate it, for want of proper observations. You have now set it at rest." "We should try and explain *how it is*, that an atmosphere, nearly surcharged with vapor, proves so powerful a cause of disease. I hope your attention will be particularly directed to this point. I heartily agree with your views as to the nature of *malaria*. It is not any *single*, *specific poison*, but an impurity of the air, from foreign contamination or other causes. *This* is a great point gained. It reconciles conflicting views, and opposing and diverse doctrines and theories. You have, for the first time, established a great principle of universal application, and you will be regarded, not only as a great public benefactor, but as one who has discovered a truth not less important to the world than that of the protecting power of the vaccine virus against Variola. We now understand why the fires, in Capt. Cook's vessels, preserved his men from sickness, even in tropical climes, so that he lost but one man in his whole fleet, in his voyage around the world.

"I need not say, that I discover no flaws in your reasoning, nothing in your conclusions to which I do not cordially subscribe. At a meeting of the New York State Medical Society held last week at Albany, Dr. Coventry, the President, in his address before the Society and the Legislature, spoke of your report as a proof of the advance now making in Medical Science, and as throwing great light on a subject of universal importance to the community. In a recent letter to me, he says he considers it one of the most important documents ever published in this or any other country, the present century, and says it inaugurates a new era in sanitary science."

And in an other:

* * * "but you know there is high authority for the statement, a prophet is not without honor, save in his *own country*. It is what we constantly observe. * * * I regard it as a sure sign that we are doing something likely to be creditable to ourselves and useful to mankind. Jenner and Harvey, were they alive, would tell the same story, and Rush would reëcho it, in still more emphatic tones (I do not mean, by the above to compare *myself* with either of these, but I do think *you* may, without presumption.) You have produced the most complete

and most satisfactory sanitary document ever given to the world. Such is my deliberate conviction, after reading it twice over. I am acquainted with productions of this class—both foreign and domestic; and I know not a single one, in any language, which embraces so fully all the necessary scientific elements to render its conclusions decisive, as yours. I know no one which has cost one tythe of the labor and study,—nor do I know one where the results have been arrived at, after such careful observation and scrutiny of all the facts bearing upon them. Your report—as a specimen of philosophical analysis and pure inductive reasoning, may well stand as a model among writings of this class. Considering the difficulties you had to encounter, weighed down by the cares and anxieties incident to a large practice—surrounded by the sick —the dying and the dead;—to say nothing of the depression of both mind and body, incident to the hot and relaxing summer climate of New Orleans, you have performed a Herculanean task. And, when I contemplate the mass of observations you have made, under all these disadvantages, and that too, single-handed and almost alone; and when I consider, moreover, the inestimable nature of the results you have established, and the facts you have, for the first time, given to the world, I scarcely find words adequate to express my estimate of your labors; not only to your own city—but to mankind at large. I sincerely hope you may be rewarded for your efforts. It is rare to find men who have the moral courage to stem popular opinions and prejudice, to risk their popularity by exposing the insalubrity of their own localities; although, at the same time, they demonstrate both the causes and the means for their removal. Merchants, in particular, have always been very sensitive with regard to any published statements, which go to show that their city is more insalubrious than others, or that an epidemic is raging, and they seem to regard it in the light of a personal injury almost, for medical men, to sacrifice their time, their health, and often, their lives, in efforts to improve the salubrity of their residences, to do which, it is necessary, first, to prove that they are sickly. You have done a noble work;—its value can never be estimated in *money*. You will have that, which is worth far more,—the gratitude and thanks of the scientific world—a prominent rank among the true disinterested and great benefactors of the world. Were I a citizen of New Orleans, I would delight to use my influence to do you special honor, by seeking to obtain for you a public recognition of your valuable services, in votes of thanks from your enlightened municipal government, and also something more substantial, though labors, like yours can never be sufficiently remunerated by money.

Extract from letters from Prof. S. B. Hunt, of Buffalo.

"Your report is, by far, the most complete thing of its kind our country has produced, and cannot fail to have a large influence on the future fortunes of New Orleans. You told the disagreeable truth with so much firmness and pointed out the remedy so clearly, that it ought to win you some reputation as a man of fearless character, as well as scientific skill.

"I am, as I give the subject more study and reflection, more and more convinced that you have solved the riddle of malaria on common sense principles. The laws of miasma and contagion may now be said to be understood, the real chemical nature, the *entity* of miasma, may remain as a puzzle for chemists, but were we to ascertain all about its real nature, it would not help us practically in avoiding its consequences, we know already how to do that.

"I hope that your efforts may bring about some sanitary action which will result in reducing your mortality. No one can study this subject closely without adopting your conclusion that these epidemics are 'preventable.'"

Extract from a letter from Prof. E. B. Coventry, President of the Medical Society of the State of New York, &c.

"I know of no work which has emanated from the medical press, since I first entered the profession, which is now over thirty years, calculated to do so much good to the public and medical science as this report. It has been a work of great labor, but the reward must be in the consciousness of the unlimited blessing which it will confer, if properly appreciated and the suggestions adopted. I think the long disputed question of the contagiousness of yellow fever is set at rest."

Extract of a letter from Dr. R. La Roche, of Philadelphia.

"Without flattery, I can say you have produced a capital work. One which will do you infinite credit. The work will compare advantageously with anything of the kind I have seen, even with the great Cholera Report of the London College of Physicians, and this is not saying a trifle.

Extract from letters from Prof. P. Blodgett, of the "Smithsonian Institution."

"I am sure this report will be received as decisive of the influences causing epidemic yellow fever." "I have been struck by the force and conclusiveness of your researches respecting an *epidemic atmosphere* and the predominance of atmospheric over all other agencies in most cases.

"I cannot do less than express my strong sense of the advance which these researches make in pure science, as well as in its collateral or applied relations. No fields in physical science, since nor before, have opened so widely and so favorably."

Extract of a letter from a distinguished gentleman in ———

"It is certainly a most important work on matters of the deepest interest to the well being and prosperity, not only of our own mighty south, but every country on the habitable globe, from the 40° South to the 40° North. It embraces, I am satisfied, an extent and accuracy of observation, a patience of inquiry, an amount of experience and skill, and a fullness of facts, illustrations and reasonings that have never before been applied to the subjects of which it treats. Your name, Dr. Barton, will go down to posterity connected with these subjects. That your efforts may prove the commencement of a new era in epidemic, endemic and infectious diseases, and may contribute largely to the mitigation of their prevalence and virulence, and in bringing them under the control of the enlightened and intelligent physician is the earnest wish of, my dear sir, yours, —— ——.

Extracts from Letters from Dr. G. Bettner, of New York

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"I cannot commend your labours too highly. I regard this report as being the most profound, as conveying the mostrational and philosophical opinions upon the important subject of etiology, that has ever been compiled in this or any other country."

From Prof. Forshey.

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"It is a contribution to knowledge and public welfare. This report is quite without a parellel in the scope of my reading. All sides of the questions of contagion—importibility—domestic and foreign origin, seem fairly represented; and the varied phenomena of outbreak and subsidence may be read, and the deductions made by the candid reader for himself. And, without speaking very positively, I think that most of these will arrive at the general conclusions stated by the Commission. New Orleans should be proud of this book, and the edition should have been large enough to be widely distributed.

"Your first diagram, or chart B, is one of the most instructive and interesting sheets, (if not the most so) the volume contains. Indeed I am not yet done studying it. The relation of the '*drying power*' to the two great epidemic diseases, would appear to be in an inverse ratio. Did you not tell me that the meteorology of the epidemic portion of 1854 gave the like result? [I did.]

"The difference in the temperature in the sun and shade, is a new enquiry —or rather, a new key to some important sanitary influences. I have never seen a systematic representation of this great difference at the epidemic period, until in your charts. Every one in the habit of watching his own sensations, knows that in September, particularly, this difference of temperature is insalubrious. I have, for many years, watched my sensations, and avoided these extremes."

Extract from a Letter from Gen'l Jno. Henderson of New Orleans.

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"I have read with an interest, surprising to myself, your forthcoming work, modestly styled a '*Report*'—on *everything* connected with the sanitary condition of New Orleans. It is a monument of scientific reasoning—research and practical observations—and, if generally read, can scarcely fail to establish your views with the community of New Orleans—whilst (as a prophet always has least honor at home) it must be greatly appreciated by the scientific and professional world abroad."

Extract from a Letter from Thos. Hord, Esq., an Intelligent Planter, Near Centreville, Attakapas.

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"I find it to be, what I consider *the only scientific view*, that has ever been furnished of the true origin of what are generally called epidemic diseases. If your citizens, and generally through the country—more especially the villages, would only read, and *understand* such a work, and be *governed* by it, and *follow* the principles laid down, how soon would our country be a model for the whole world?"

Extract from a Letter from a Gentleman in Virginia.

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"All I can now say of it, is:—that the conception of Lieut. Maury—that he could point out a road upon the trackless waters that would shorten distance and promote safety,—that by looking at the logs of numerous vessels for years and for every season when storms were there natural—their character and how to avoid, in great measure, their force and danger;—and then, the indomitable industry with which he pursued his theory to practical results—was, and is a monument—a proud one too, to the intellect of man. But, yours,—what can I say of it; the mere conception, that a finite mind could explore, and find in the atmosphere—the exhalations of the earth—at mid-day and in the night—which, like the wind, none knoweth whither it comes, or where it goeth—the labour to obtain the materials upon which to build a theory—the uncertainty to what the facts would attain—their value, if it could be attained, and this research made with medical theories, and from great names too, weighing down and depressing, or calculated so to do, the most energetic mind, is, in my judgment, the grandest, the most benevolent object, to which the human intellect was ever before applied. I do hope—not for the applause of mankind, but, that in your own heart, you may reap, in the fullest measure, the happiness that must arise in the belief of any man, that he has benefitted his kind."

Brief notices from Medical Journals.—New York Medical Times.

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"The result is a volume unsurpassed in extent and variety of information respecting yellow fever, which reflects great credit both on the city which originated it and the physicians who have executed it. By far, the most elaborate and extended of the separate reports, is that by Dr. Barton, to whom was assigned the arduous duty of making a thorough examination into the sanitary condition of New Orleans. This report is drawn up with great care, and embraces an amount of information which will be sought for, in vain, elsewhere. The range of his labors extends through all the realms of the yellow fever zone, in both South and North America, the West Indies and the East Indies.

"Two principles are thought to have been settled by the commission, that yellow fever is, and always has been, a *preventible* disease, and that the presence of two general hygienic conditions are absolutely indispensible to the origination and transmission of the disease, the one atmospheric, the other terrene; *both* of which must meet in *combination* to produce the result."

From the Boston Medical and Surgical Journal.

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"It is a work of laborious research, of extended and reliable testimony, and, to all appearance, of the most zealous and honest endeavor after truth. We heartily commend it to the inspection of all who would learn facts in reference to yellow fever, even if they never expect to cope with the disease. We firmly believe that atmospheric causes, the state of the dew-point, and every hygrometric condition, have a powerful effect upon disease.

"Dr. Barton has the boldness to tell the authorities of New Orleans the whole truth about their city, and both they and all the inhabitants should thank him and his associates for the information and the facts contained in this volume. If one-half, only, be true, it is an invaluable gift to make to the city. The extended research and entire devotion to their duties, which are manifested, command our admiration. They have spoken out boldly like honest men and medical philosophers. The report is a monument for transmitting the names of those, who have recorded their observations in it, to after ages. They discovered filth enough in the city to create a plague, and have had the honesty and fearlessness to proclaim it in the cars of the magnates. With reliable intelligence to guide the civil authorities, if the Board of Health permit another epidemic of yellow fever to mow down the citizens, their own fortunes may be involved in the ruin. Clean your streets, gentlemen, drain the bogs, carry off the night soil, air the basement rooms, sleep in dry apartments, and obey the ordinary laws of health, as the first movement towards putting the city on the defensive. We feel a deep interest in regard to the sanitary action of the authorities of New Orleans. Dr. Barton can do no more to enlighten the people or direct the magistrates. By following out in detail the inferences which he has drawn from the facts presented, and on which this report is based, New Orleans may yet establish a reputation for cleanliness and exemption from fatal epidemics."

From the Western Lancet.

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"The fearful epidemic of 1853 aroused the public sentiment of New Orleans to the importance of adopting some better sanitary regulations. The Sanitary Commission has exhibited much industry and perseverance in collecting such a vast amount of material information; and the City Council has manifested an unusual degree of liberality in affording the means for this publication; showing that all parties concerned have taken hold of the subject with energy, and a determination to fathom, if possible, to their lowest depths, the mysterious causes of the two greatest scourges of cities, *yellow fever and cholera*."

From the Buffalo Medical Journal.

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"This Report has been long and anxiously expected by the student of etiology. Great expectations have been raised from the liberal provision made for it, from the scope of discussion allowed, and particularly, from the high character of the gentlemen appointed to prepare it. At the head of this commission was Prof. E. H. Barton, who has better claims to distinction as a meteorologist, than any other man in the country, when we take into consideration the time through which his observations have extended, and their care, accuracy and daily frequency. There is no one-idea-ism, no hobby riding about this production. In assigning to terrene and atmospherical causes their proper share in the causation of disease, we find neither the exclusive doctrines of the miasmatists, nor the absurdity of those who, recognizing the weak points of the malarial hypothesis, fly wildly to the other extreme, and claim to find in the filth and foul odors of a dirty city its protection and safe guard against the ravages of epidemics. The middle ground is the safest, and to use Dr. Barton's expressive phrase, we have in the meteorological and terrene causes, the two blades of a pair of shears, useless when single but the very shears of Atropos, when combined.

"The principal arguments enumerated to show the influence of this combination are briefly these:—In all the yellow fever zone, where ever the meteoric condition was observed, a high dew point was the unfailing accompaniment of the disease. With what is usually called the 'caprice' of epidemics, one uncleanly city suffered, while its equally dirty neighbor, escaped. Here, those places which were kept clean were healthy, though they had a high dew point. Those that were uncleanly, suffered if they had a high dew point; and, wherever a high dew point and uncleanliness were associated, the epidemic prevailed in a direct ratio to the intensity of these two conditions.

"These are the results in places where the meteoric condition was known by actual observation. In other places, it was arrived at by approximation—judging from the frequency of the showers, the presence of mould, and the decay and imperfect nutrition of the fruits of the earth. Fortunately these observations, which extend over the whole yellow fever zone, from Philadelphia to Rio Janeiro, are supported by the most careful testimony.

"The reasonings derived from these facts cannot be confined to the yellow fever zone. We have found it at Buffalo, where the cholera confined its ravages to the low lying districts, and to those situations, where filth and lack of draining invited it to localize. There also we found the allied diseases of the summer season, and when our investigation of the favorite localities of all the zymotic diseases is completed, there we expect to find the habitat of typhus—of scarlatina—of rubeola and the other exanthemata. Again we may refer to the cholera of 1852 in this place, where Prof. Hamilton traced so clearly the influence of the upturning of the earth, with a stagnant atmosphere, in the immediate causation of cholera. The investigation of modern meteorology, has settled the whole question of miasm. There is no longer room for two opinions on the subject."

Report Select Committee U. S. Senate on the Sickness and Mortality on Emigrant Ships.

Senator Fish points out the fact that typhus, cholera and variola are the peculiar curses of the immigrant on ship-board, that these do not exist there without a local cause, and then demonstrating what is the cause, he calls for reforms precisely analogous to those demanded by his southern confrere in hygiene. In this laical report, by a gentleman whose study has been civil policy rather than natural science, we have the calm unprejudiced convictions of a logical mind, reaching the same conclusions which are more amply proved by the researches of science.

"Both, then, assert distinctly the doctrine of the preventibility of zymotic disease—Senator Fish in the narrower sphere allotted to him—Dr. Barton in the whole range of zymotic disease. We believe that the evidence warrants the conclusion. The additional responsibility thus thrown upon the shoulders of governments becomes a serious study for the statesman."

"The report of this Commission will, in itself, be a monument to Dr. Barton's untiring industry and devotion to the public good. Should his suggestions and recommendations be faithfully carried out, he will have a nobler monument in the health and prosperity of the great city of which he is so valuable a citizen."

Extracts from the Southern Medical and Surgical Journal.

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"The report upon the sanitary condition of New Orleans, by Dr. Barton, embodies an immense store of interesting matter, illustrated by tables, charts, &c. It is indicative of great industry as well as familiarity with the subject on the part of the learned reporter, and must take place among the most valuable documents of the kind. The table No. 2, "showing the life-cost of acclimation, or liabilities to yellow fever from nativity," as exhibited by the epidemic of 1853, in New Orleans, is very striking; from these data it would appear that southern nativity, both in America and Europe, is singularly protective or antidotal, &c."

From DeBow's Review.

"We have no hesitation in saying that this report is the ablest work upon sanitary matters ever published in America."

From the Bee.

THE SANITARY COMMISSION.

The ancient and approved maxim in the policy of enlightened governments, that in peace it is well to prepare for war, may be applied with equal appositeness to the Sanitary regulation of our city. In health prepare for sickness. New Orleans is now free from epidemic visitations. The advent of winter has completely annihilated the germ of that scourge which has so often desolated our community, and which, by its ravages for the two past summers, has inflicted more injury upon us than could possibly have resulted from the most wide spread and disastrous commercial crisis. It is the part of true wisdom to take warning from experience, and of sound policy to provide safeguards for the future. Vain and futile will be our best devised schemes and most persevering efforts to build up the prosperity of New Orleans, and to render her the paramount mistress of Southern commerce, until we shall have succeeded in banishing from our midst the pest which from time to time decimates our population, and produces panics that effectually prevent its steady and rapid increase.

Thus far, we are bound to confess, our city authorities upon whom the labor and responsibility of watching over public health particularly devolve, have evinced ignorance, apathy and neglect. The dreadful mortality of 1853, seemed to bewilder and stupify without adequately arousing them; the mitigated but yet serious pestilence of last summer scarcely awoke them to the consciousness of duty. Surely the epidemic of 1853 would have startled any other city in the world into the necessity of active and unremitting exertions to discover its cause and to prevent its recurrence. But with us two such visitations occurring in immediate succession were required, ere the languid sympathies and drowsy consciences of the Council could be effectually stimulated into action. Something, however, though not much, has at length been accomplished. A sanitary commission was appointed, and vested with authority to institute an elaborate investigation into the subject, and report thereon. This commission was composed of some of the ablest and most learned members of the medical faculty, and at its head was placed Dr. EDWARD H. BARTON, whose prolonged experience, profound study of epidemics, admirable qualities as a careful and minute observer, and thoughtful and sagacious reasoner, make him eminently fit for the position. After long and laborious research the commission has reported, and the results are before us in a volume of considerably over 500 pages.

It is quite impossible for us, within the stinted limits of a newspaper article, to do the scantiest justice to the merits of this report, embodying as it does not alone the testimony of a large number of physicians, but a copious paper on the sanitary condition of New Orleans, by Dr. BARTON, in which are displayed patient and long continued study, a painfully exact record of meteorological and other phenomena and conditions which are concomitants of epidemics, comparisons of mortality carried through a period of nearly two generations, and deductions drawn with the utmost care from an almost gigantic collection of premises. As a monument of individual industry; as the evidence of what can be performed by a single earnest, well taught, vigorous and inquiring intellect, this work is probably unrivalled in the annals of medical investigation. Let it never be forgotten that the conclusion reached by Dr. BARTON is, that "*yellow fever is an evil, remediable and extinguishable by human agency.*" Having demonstrated this important truth, the author of the report sets forth in detail the various measures to be employed for the gradual but certain banishment of the epidemic. They are, of course, hygienic in their character, and comprise many suggestions heretofore offered, with some others, peculiar, we believe, to the writer. The theory that yellow fever is the invariable sequel to a marked disturbance of the soil of the country, is one which we do not remember to have ever seen advanced before, and we must admit that the anologies cited by Dr. BARTON, and the illustrations and arguments used by him in support of his views, seem to us to bear the impresss of truth.

We do not propose to extract from the report the various plans recommended by the author for the removal of the causes of pestilence, and for effectually precluding its recurrence. The subject has undergone a rigorous scrutiny, and the Council to which properly belongs the task of preserving public health, have before them the conclusions of the commission embodied in the report. We fervently trust that this matter will not, with habitual recklessness and indifference, be suffered to die away and be forgotten. Do not let us repose in supine sluggishness, until the coming of another storm. Let the authorities take up the report of the Sanitary Commission, examine it deliberately, give their sanction to its views, and resolve to enforce them practically. What if the adoption of an extended system of hygiene should prove somewhat expensive! Balance the cost against the enormous outlay, positive and prospective injury occasioned to New Orleans by every epidemic visitation, and say whether, if immunity from the scourge can be secured by an expenditure of half the annual revenue of the city, it will not be cheaply purchased? The direst folly is that candle end and cheese-paring economy which revolts from the appropriation of money designed to guard against evils which inflict more than twenty times the pecuniary loss.

From the National Intelligencer.

THE YELLOW FEVER OF 1853.

We have received from Dr. Edward H. Barton a copy of the "Report of the Sanitary Commission of New Orleans, on the epidemic yellow fever of 1853, published by authority of the City Council of New Orleans." The subject is undoubtedly one of great interest, not only to that city, which has recently suffered so much from the ravages of the epidemic, but to all other large commercial cities of the Union, most of which have been, at one time or another, the scenes of its desolating visits, and all of which are liable to the operation of the causes which are supposed to produce it. We understand that only a limited number of copies of this very able report have been published for distribution among the correspondents of the learned and scientific members of the Commission; and we have therefore thought it our duty to refer, in a brief and summary manner, to some of the principles enunciated in the report, and to the sanitary measures which the Commission, in their joint wisdom, have deemed it proper to recommend.

Four subjects were submitted by the Board of Health to a special commission, composed of the most experienced and scientific physicians of the city, for inquiry and investigation. These were:

"1st. To inquire into the origin and mode of transmission or propagation of the late epidemic yellow fever.

"2d. To inquire into the subject of sewerage and common drains, their adaptability to the situation of our city, and their influence on health.

"3d. To inquire into the subject of quarantine, its uses and applicability here, and its influence in protecting the city from epidemic and contagious maladies; and

"4th. To make a thorough examination into the sanitary condition of the city, into all causes influencing it in present and previous years, and to suggest the requisite sanitary measures to remove or prevent them, and into the causes of yellow fever in ports and other localities having intercourse with New Orleans."

These several subjects of inquiry were distributed among the different members of the Commission as follows: The first to Drs. Axson and McNeil; the second to Dr. Riddell; the third to Dr. Simonds; and the fourth to Dr. Barton, whose report occupies more than two hundred pages of the volume. It is most ably and elaborately drawn up, and is accompanied by numerous maps, charts, and tabular statements of great interest. But, as we could not hope to do justice to its merits by any abstract so brief as our want of time and space would compel us to make of it, we must content ourselves with stating, in a few words, the most important results of the investigation entrusted to the Commission. These will be found to be of a cheering character, furnishing good grounds for hope that, if the sanitary measures recommended by the Commission should be adopted, the time is not distant when the dread of this terrible epidemic will no longer be felt in any of our commercial cities. The gratifying conclusions to which their extended inquiries and examinations have led the Commission are, first, that yellow fever is and always has been, in New Orleans and elsewhere, a *preventible* disease; and the second is, that the presence of *two* general hygienic conditions are *absolutely indispensable* to the origination and transmission of the disease, the one of them *atmospheric*, the other *terrene*. These must meet in combination, or the disease is not generated. The absence of *one*, so far as yellow fever is concerned, is equivalent to the absence of *both*; and, as one of these conditions is almost wholly within the control of man and the other partially so, it must follow that his power extends to its prevention and expulsion. The corollary from this is, that the disease is of local origin; that it is under no circumstances personally contagious; and that its infectious proprieties are only communicable in a foul or infectious atmosphere. It is not by this intended to be denied that the disease is often *imported;* that is, persons infected with it may arrive from abroad, or vitiated and infectious air may be brought in goods and various ways; but neither the one nor the other can propagate the disease, except under the combination of the conditions mentioned.

We cannot but hope that a second edition of this valuable report will be published, sufficiently extensive to afford every physician and every Board of Health in our large cities an opportunity of procuring a copy. We do not pretend to decide whether the opinions delivered in it or the principles established by it are legitimately derived, in a professional point of view; but there seems to be to us a great deal of important information, collected with much labor from a great variety of sources, which ought in some way or other to be spread before the public.

From the South Carolinian.

YELLOW FEVER.

Report of the Sanitary Commission on the Epidemic Yellow Fever of 1853. *Published by authority of the City Council of New Orleans.*

We are indebted to the Chairman of the Committee for a copy of this very valuable and interesting report on a subject of much importance to New Orleans, the medical fraternity, and the public generally. Dr. E. H. Barton, the Chairman, is the most fit and proper man who could have been selected to collect the testimony on this topic. A long residence in New Orleans, in Cuba, and in Vera Cruz, under the most favorable circumstances for observation, with extensive correspondence abroad, entitle him to great respect for his opinions; and, in addition to his own views, we are favored with those of other eminent co-laborers in New Orleans, and various localities where the terrible malady periodically exists.

The limits of a newspaper will not allow us to do more than briefly to allude to the results of the laborious investigation here published.

The most important to the general reader is that the accumulated testimony of those who have communicated their experience to the commission is in accordance with the opinion of the medical profession generally, that the disease is not contagious. Hear what they say:

We are sensible there is great difference of opinion among the members of the profession, and in the community, in relation to the communicability of yellow fever, and have investigated the subject with great care in the following pages, and the conclusion we have come to is that yellow fever is not a disease personally contagious; that its infectious properties are only communicable in a foul or infectious atmosphere; that is, that a foul vessel or individual with the disease, will only propagate it under atmospherical and local conditions similar to that which furnished its nativity. That although vitiated or infectious air may be conveyed in goods, and in various ways to distant places, ventilation speedily despatches it; and that if disease results, when it is much concentrated, or with very susceptible individuals, it extends no further, except under the conditions above specified. The occurrences of the last season, and, we believe, all antecedent years, supply us with innumerable illustrations in the establishment and corroboration of these important principles."

We would call particular attention to the principles announced in this report, of *two conditions* being required to be in unison and combination to produce yellow fever, *The meteorological and terrene.* For that of the first, a certain state of the dew point is essential, (this is more especially developed in the "Introduction;") and the worst state of the other is the disturbance of the original soil of the country. It is within the knowledge of our old citizens, that the digging of the Columbia Canal, in 1819, was attended by the development of a serious and fatal fever, and these excavations of earth have been often noticed elsewhere as producing sickness. We must defer to a more leisure period an analysis of the volume here noticed. We trust its publication will have the effect of causing observers to institute meteorological experiments, and to look to the dew-point as an important weather-gauge—as an indication of public health, in connection always with the most thorough cleanliness.

We would commend to the attention of city councils generally the advice given so freely and so much in detail in the report—to adopt sanitary regulations for the sake of their reputation as well as their interests, and to put them right before the world; and we would advise them to place in their health departments, men whose characters are guarantees of their sincerity as guardians of public hygiene.

As the report has been only published for private distribution by the City Council of New Orleans, we would suggest to the chairman of the committee the importance of an edition being issued for sale, as the mass of testimony in relation to yellow fever should be widely circulated.

From the Journal of Commerce.

REPORT OF THE SANITARY COMMISSION OF NEW ORLEANS.

Dr. Barton's essay on the sanitary condition of the city, is the most voluminous contribution of all, and makes up nearly half of the entire volume. In addition to maps, and several elaborate statistical tables, there are accompanying contributions from eminent medical men in Rio, Pernambuco, Buenos Ayres, Guayaquil, Puerto Cabello, Barbados, Martinique, St. Thomas, Vera Cruz, Texas, and Bolivia, besides many towns and rural districts at the South.

The mass of collaterial testimony thus collected is very valuable, and embodies many important truths.

The opinions of Dr. Barton, from his long course of professional experience, and his well-known scientific attainments, are entitled to the highest consideration. He considers that the yellow fever owes its origin to a combination of terrene and meteorological causes, both of which are necessary for its development and propagation. The *local* origin of the fever is clearly established, and contagion repudiated. These are very important deductions, and show the necessity of associating the healing art with the natural sciences, and looking to Nature for the elucidation of pathological phenomena.

In the present stagnation of medical science, while the orthodox members of the profession are still clinging with pertinacity to obsolete ideas; and the new lights, or *fantoccini*, are amusing themselves with puerile fancies, and speculating upon credulity of others through them,—at such a time, the advent of this volume is eminently propitious, and will do more to establish rational views of etiology, than any work that has issued from the press for many years back.

This report, moreover, affords incontestable evidence to the value and necessity of efficient and competent Boards of Health for all cities, wherever located. They should be composed of experienced and well-qualified medical men, and should be invested with co-ordinate powers in the municipal government of the city. In a recent address before one of the Medical Associations here, Dr. Griscom paid the flattering compliment to the New York Board of Health, of asserting that, out of the fifteen or twenty persons who composed it, there was not a single physician among them, nor any individual with sufficient skill to discriminate between a mosquito bite and an incipient pustule of small pox.

In nearly every paper of the collection, the views expressed are sound and philosophical.

This volume, we repeat, is a decided step in advance, in the correct and faithful exposition of professional truth. That it will command the attention, at home and abroad, which is justly due to its merits, there can be little doubt. It is an honor to the different co-laborators of the joint commission, and to the city through whose enlightened liberality it has been given to the world.

[From the New Jersey Medical Reporter.]

* * * "The city of New Orleans did something for science when her Board of Health appointed the Sanitary Commission, whose Report lies before us. The value of such a work can scarcely be estimated, and, if anything is lacking, it is a record of the names of the men composing the Board who ordered the Commission."

[From the Nashville Journal of Medicine and Surgery.]

"*The same number of pages upon no topic, since the appearance of Jenner's Essay on Vaccination, has laid the profession and the public under so deep an obligation.* Appearing at a time when municipal authorities were blundering and hesitating among hygienic absurdities, in search of means to drive back or restrain the "pestilence that walketh in darkness," it will arouse and intensify the popular mind upon the subject, and insure the adoption of the regulations, it so eloquently and logically enforces. Dr. Barton shows that the efficient cause of yellow fever requires for its evolution a conjunction of meteorological and terrene phenomena which man can prevent, and, therefore, that it is within his power to drive this scourge from our shores, and resuscitate the waning prosperity of cities heretofore devoted to its ravages."

[From the New Orleans Medical News and Hospital Gazette.]

"The fourth and last branch of the Report, by Dr. Barton, on the sanitary condition of the city and causes influencing it, presents a wide field, which the author has labored with an imposing, valuable and irresistible array of facts to demonstrate what is in accordance with the common sense, common feeling, and common experience of mankind—the antecedent necessity of vitiated atmosphere from vegetable and animal effluvia to generate epidemic disease. This, with certain meteorological conditions, high temperature, great humidity, stagnant atmosphere, &c., are essential to the production of yellow fever.

"The Doctor has argued this point with the enthusiasm of the philanthropist, of the lover of truth for its own sake, and with the detailed experience of the sage, in a treatise of great length, every proposition of which is fortified by fact, or pregnant with suggestion. There is no citizen of New Orleans who can fulfill his public duties as intelligently without the information given in this Report, as he can with it; and to all to whom health individually, as controlled by personal habits or health as modified by general influences of which the individual has no control, except as a part of the governing power; to all to whom the individual prosperity, as controlled by the general prosperity, is a matter of deep concern, (and to whom are they not of the deepest?) we recommend to make themselves conversant with this Report and to act resolutely in their several spheres to bring about the remedies it suggests."

[From the New York Medical Times.]

"Dr. Barton has furnished us a reprint of his very valuable Report, read as Chairman of the Sanitary Commission of New Orleans, on the epidemic yellow fever of 1853, of which we took occasion, in a former number, to speak in the most favorable terms; and we are happy it will thus enjoy a more extensive circulation than it could in its original shape. *We regard it as one of the most important contributions to medicine of the present day.* The testimonials which Dr. B. has received, to its excellence from the highest sources in our courtry, show the favor with which it has been received. That yellow fever is a *preventable* disease is a proposition full of encouragement, and one which Dr. Barton believes to be very satisfactorily sustained by his observations at New Orleans."

[From the New Orleans Creole.]

REPORT OF THE SANITARY COMMISSION.

"This most important volume has been placed in our hands by the kindness of Dr. Barton. It contains a fund of information on the interesting subject of the public health of New Orleans which is invaluable. It manifests vast labor and long research, and from a cursory glance at its contents we are led to believe that no views are expressed not sustained by an astonishing array of facts.

"Of one thing we are convinced that this work will demonstrate the fearful mortality occasionally witnessed in this city to be the result of gross neglect of sanitary laws by our public authorities.

"We have presented the singular spectacle of a great commercial city, with interests, vast and growing in magnitude each year, to a great degree dependent upon the prevalence of health, without taking a single step to prevent the prevalence of epidemics. Experience should have long ere this, taught wisdom, but we seem, with stoicism of the Oriental fatalist, to have patiently borne whatever fate presented, without attempting to avert its blow or enquire into its cause.

"That there are laws governing the appearance of yellow fever in this city must be evident to all: for nature never works by chance. When our population had been repeatedly almost decimated in a few months, bsuiness arrested and the prospects of the future blasted by this terrible scourge, it was the dictate of reason to have inquired into the cause; to have brought all the powers of observation and reflection to a solution of the question, how the health of New Orleans could be preserved—the fearful visitation averted.

"And yet the public authority has virtually done nothing. With difficulty was means obtained from the treasury to put into durable form the result of the long and careful labors of the profession best qualified to investigate the facts presented and deduce conclusions from them.

"The views contained in this volume are so important, and the conclusions reached furnish such unmistakeable evidence that human means may ameliorate, perhaps absolutely prevent, the recurrence of epidemics, that we must take the liberty on a future occasion to condense and popularize them in the hope of inducing a more enlightened attention to the subject of public health."

[From the Philadelphia Medical Examiner.]

"If the calamitous invasion of the pestilence of 1853 had produced no better ultimate effect upon the sanitary fortunes of the Crescent City than the development of this voluminous and most elaborate Report, there would be reason for material consolation in the vitally important lesson it thus teaches for the future in regard to the etiology and prophylaxis, or rather aggravation and modification, of the dreaded epidemic.

"We have been greatly interested in the copious details and various practical suggestions of Dr. Barton and his colleagues, and can safely recommend their manifesto to the attention of all who take interest in the study of public hygiene, as well as to all investigators of the course of the present epidemic scourges of the world. The growing extent of popularity of these sanitary inquests, afford gratifying evidence of a far more enlightened appreciation of the benefit of hygienic regulations than formerly prevailed in the councils of the nation and among the people generally ; and we are so fully convinced of the value of the feeling thus awakened, that we are anxious to encourage, in any proper way, a mark that is so well calculated to make a good impression as the one before us. There is much striking evidence collected in its pages ; and the practical conclusions are so freely and forcibly presented, notwithstanding a little very natural extaavagance, that we earnestly hope it may exert a lasting influence, not only upon the community to whom it was addressed, but upon their more favored neighbours in other portions of this continent. In fact, much that is stigmatised and recommended in relation to yellow fever in the South, will equally well apply to the cholera and other malignant diseases in any portion of the country, and may hence be profitably pondered over in all quarters of the land.

"The Report of Dr. Barton, with its accompanying maps, charts, hygeometrical and other meteorological tables, occupies, as it should, by far the lion's share of the whole production. It is a monument of pains taking industry, abounding in zealous discussion and explanation of his ideas respecting the origin and causes of yellow fever and the best mode of counteracting them.

"We would be glad to notice, to some extent at least, the table in which he has presented what he calls "Climatic or meteorological elements of yellow fever at New Orleans" in different years. The deductions from this table are among the most interesting peculiarities of the whole Report. Although they may afford no decisive information with the present data, they are certainly very hopeful indications of an extensive and yet, unexplored field.

"The cenclusions of Dr. Barton are substantially the same as those of the British General Board of Health, which he quotes in full, with the strongest expressions of approval. We could not, if it were desirable, repeat those conclusions here, or explain them in detail. Suffice it to say, that yellow fever is local in its origin ; that the conditions which influence its localization are known, definite, to a great extent removable, and very much the same as those of cholera and all other epidemic diseases ; that it becomes more rare, more mild, or disappears in proportion as the local causes are abated or removed, and that, consequently, the means of protection are not quarantine restrictions and cordons, but *sanitary works and operations*, having for their objects the removal of the population from exposure within the infected districts of the operation of those sources.

"No resident of New Orleans, or indeed of any other city of our Union, could candidly examine the exposition of Dr. Barton without instruction; and we hope for the sake of the common weal, that it may be carefully and widely studied, in the North as well as in the South. There are many hints to be found in it which would be well worth attending to in places north of Mason and Dixon's line, no less than in the warmer regions of our more exposed neighbors.

"It was intended for the public at large, and is therefore addressed to the nation instead of the profession: and should it meet with but a small share of the consideration to which it is entitled, the people of New Orleans cannot fail sooner or later to derive a lasting and inestimable benefit."

[Extract of a letter from Wm. Brawne, M. D., of Fredricksburg, Va.]

"Receive my grateful thanks for a copy of the Report of the Sanitary Commission. I do not flatter you when I say that your paper on the sanitary condition of the city, contains a map of valuable information well digested and most judiciously arranged, that cannot be found in any paper I have ever read, and I have read much on the subject." * * * * "The various circumstances which you have embodied and arranged connected with the disturbance of the soil—the hygrometric and other conditions of the atmosphere,—the comparison now instituted between the local position of your city, the peculiarity of its soil and its proximity to water courses, marshes, &c., with others throughout the whole range of the yellow fever zone, requiring an immense amount of labor which few could have been found to encounter, have gone far, if not to the entire extent of elucidating those conditions in yellow fever districts which produce the causes of the disease, to prove its local origin—and that proper hygienic regulations judiciously administered, will, most probably form an effectual barrier against the encroachments of this most fatal malady.

"I have not had sufficient time to give this report the thorough examination I could wish and which I design to do. The immense mass of facts it contains—and the variety of information derived from such various sources upon which its reasoning and conclusions are deduced, render it necessary that it should be *studied* not merely read."

And in another from the same:

* * * * "The protracted and onerous labors of the members of the Commission, and the immense benefits likely to accrue to the best interests of the city from them, is eminently entitled to the highest appreciation by the civil authorities. If I am not much mistaken, the publication of the several reports of your sanitary commission will form a new era in the investigation of the causes of epidemic diseases and result in incalculable blessings to countries subject to epidemic influences. It is only those who are by education capable of placing a proper estimate on the value of such services as have been rendered who can properly appreciate the obligation which the city owes to the members of the Commission. Money can scarcely remove it."

From the New Orleans "Creole."

IMPROVEMENT IN PRIMITIVE MEDICINE.

We cordially invite the attention of our new Council and scientific men to the extracts below, which we have made—the first from the last number of the British *Medico-Chirurgical Review*—the highest authority, we are informed, in such matters, in England, and the second from the last volume of the American *Medical Association*—the highest source in this country, in relation to the estimation of the labors and improvements in primitive medicine of our distinguished fellow-citizen, Dr. Barton, are held by these eminent authorities. And we have seen letters from Paris showing how these same labors are appreciated by such men as Louis, Clot Bey, Baudin, and other savans. All unite in saying that the practical application of the views put forth by Dr. B. would be of immeasurable importance to New Orleans.

That these remarkable doctrines, now so extensively approved of not only at home but abroad, should have their paternity in our midst, should make us feel proud of their source, and we hope no time will be lost by our civic authorities in applying them for the benefit of our suffering city.

From the British and Foreign Medico-Chirurgical Review.

From an article on the history and origin of cholera, and signed by Dr. Bradlam Greenhow.

* * * * * * "Ample materials for this investigation are furnished by the very valuable and interesting reports of the Committee for Scientific Inquiries, appointed by the Medical Council of the General Board of Health in 1854, and by Dr. Barton's most elaborate report, "on the sanitary condition of New Orleans," which occupies 250 pages of the report of the Sanitary Commission, appointed to inquire into the recent fatal visitation of yellow fever into that city. Dr. Barton's report, which is unique, comprises the result of many years careful observation and inquiry as a voluntary laborer in the field of sanitary investigation. *It is well worthy of the highest commendation, and if duly appreciated by the authorities of New Orleans, will be the means of inaugurating a system of Medical inquiry and hygienic supervision in that city*, notoriously one of the most pestilential in the United States, *which cannot but eventuate in much public benefit.* Dr. Barton seems of opinion that epidemic diseases are usually the production of the locality in which they appear; and we presume he would assert that cholera is of indigenous origin, requiring only a certain season and certain local conditions for its development."

* * * * * * * * * "No evidence of so precise and accurate a character as that furnished by Dr. Barton and Mr. Glaisher on the meteorology of cholera seasons is procurable from any other source."

* * * * * "That meteorological conditions have a great influence over the development and spread of cholera no one who has followed us throughout this investigation will hesitate to admit. How important is it then, that the inquiries set on foot in 1854, and then only when the pestilence had attained its acme, should be systematically continued; that the climatic phenomena of different towns be compared, a careful register of disease, as well as of mortality, be instituted, and a comparison of the meteorological phenomena of districts and towns visited by the same classes of disease be made; lastly, that the atmospheric, electrical and thermometric phenomena of those parts of towns which are found to be notoriously insalubrious be placed in juxtaposition with those of the suburbs and healthier portions of the same."

"Hitherto meteorological inquiries have been made almost exclusively with a view to the discovery of the laws which regulate the weather and climatic character of seasons. The results obtained from the limited and partial inquiries of last year in the direction of meteorology, as applied to the investigation of epidemic disease, are so important; the promises of still more valuable information as regards the causation of disease held out by meteorology, if these inquiries be pushed into the normal as well as the unusual influences of season, so large, that we cannot resist expressing a confident hope that some system will be adopted for their continuance." * * * * *

"From a careful classification of such facts, placed side by side with the meteorological phenomena of the time and place in which they have been observed, we should gradually obtain a more precise knowledge of the effects of weather, season, and climate upon the human constitution is a common topic of conversation in this changeable climate of ours. It is, by common consent, allowed to be great, yet we absolutely possess no accurate acquaintance with the result produced on man's organization by a rise or fall of the barometer or thermometer, or the electrical state of the atmosphere."

"The presence of another co-efficient, at least is, however, necessary to give character and energy to this influence. This, as we have before said, is to be sought in the existence of certain occasional and therefore remedial conditions, which, by common consent, are termed localising causes. This constitutes what Dr. Barton has termed 'the other blade of the shears.'"

Extracts from a paper read before the AMERICAN MEDICAL ASSOCIATION, by Professor S. B. HUNT, of the University, "On the Hygrometrical state of the Atmosphere, and its influence on health."

* * * * * * * "Among those to whom I am most indebted for encouragement and assistance in my labours, I take, thus early, the opportunity to mention Prof. E. H. Barton, of New Orleans, a gentleman distinguished for his long continued attention to this specialty, and deserving from his unwearied industry and talent in associating it with the phenomena of epidemics, to be considered as the leading mind in the country, so far as this branch of etiology is concerned."

* * * * "Dr. Barton has studied climate with an almost entire devotion to the interests of the medical science and sanitary reform"

* * * * "During the past year Prof. Barton furnished to the city of New Orleans his elaborate report on the causation of yellow fever, as chairman of the Sanitary Commission appointed for that purpose. This report, from the novelty of its doctrines, the earnestness with which they were urged, and the vast array of facts brought to support them has deservedly added much to the reputation of its author."

* * * * "It will be borne in mind, that we are not authorized to ascribe Zymotic disease or the common epidemics of the country to the hygrometric condition alone. And this, I believe, is the position assumed by all intelligent meteorologists, and more especially by Dr. Barton, in his Sanitary Report, which has been strongly misrepresented in this regard."

* * * * * "Dr. Barton has shown, that no epidemic of yellow fever has ever occurred in New Orleans, without the presence of two causes, which he personifies as "the two blades of the shears." Of these, one is a *high dew point;* the other, a mass of causes, grouped under the generic name, "terrene causes." Either one, without the other, he represents as powerless; combined, they are the shears of fate."

"After a careful consideration of Dr. Barton's argument, I am more than ever impressed with its truth and importance. Heretofore, our notions of the causes of epidemics have been obscure and contradictory; the theory which seemed perfect one season, was worthless the next."

* * * "That while in some seasons the evidence of the existence and power of 'malaria' in certain districts seems incontrovertible, in the very next year we have the same terrene conditions, existing without results in the form of disease. The causes, the heat, the stagnant water, the decaying vegetation—all are there, the effect only is wanting. So widespread and common is this condition, that, even in high places, in the medical profession, we now hear the connection of filth and disease denied and derided. They tell us that New Orleans and other 'malaria' towns are always filthy in 1852 and healthy; in 1853 filthy and unhealthy. By this reasoning from a *single* condition, truthful in its premises, but *presenting them only in part*, the public confidence in the efficacy of sanitary police has been undermined, and the public mind was fast settling into a Turkish fatalism and apathy. The most common sense principles of cleanliness seemed to be contradicted by stubborn facts. 'Malarialism,' as supported and explained by Dr. La Roche, had no hold upon the medical mind, for its phenomena were too contradictory to base a belief upon."

"It was at this juncture that Dr. Barton declared that no epidemic of yellow fever had ever occurred in New Orleans when the city was cleanly; that every epidemic had been accompanied by some upheaval of the soil, and that, whether dirty or cleanly, no epidemic had ever occurred *without the presence of a high dew-point.* So far as the sanitary condition of New Orleans was known, for a long series of years, the two conditions, high dew-point and filth, had gone together in every epidemic of whatever kind."

"This position is sustained by a crowd of witnesses, and thus far contradictory evidence has been adduced. With a curious misconception of the true issue, one writer has announced that such a city, though dirty, was healthy; another, that his locality had a remarkably high dew-point, without epidemic disease; *but no one has yet proven that the two causes, meteoric and terrene, have existed together without an increase in the mortality of the location.*"

"*All the numerous contradictions in the laws of epidemic progress seem harmonized by this theory.* So far as evidence extends, we may, by it, account for either the partial or entire exemption of a city from cholera, while evidently under the epidemic influence, for the escape of the higher and cleanlier portions, for its occasional irruptions into rural districts, and, particularly, for its sudden departures from any given point."

"I will repeat the remark made once before, viz.: that after careful search, *I am unable to find any history of epidemic disease which militates with the broad and philosophic theory so ably advanced* by these gentlemen.'

Office of the Sanitary Commission,
Nov. 17th, 1854.

To E. H. Barton, M. D.,
Member of the Sanitary Commission of New Orleans.

Dear Sir:—At a meeting of the Sanitary Commission, held November 17th, 1854, the following Resolution was unanimously adopted:

Resolved, That the Members of this Commission desire to testify their high appreciation of the important services rendered by their confrere, E. H. Barton, M. D., of the labor and research evinced in the collection of the materials embodied in his Report; of the devotion paid to an important branch of physical science, illustrative of climatic influences on zymotic diseases, thus furnishing important facts for the elucidation of the subjects submitted to the Commission; and of the consistent energy and perseverance with which he has aided to carry out the duties of the Commission from its inception to the close of its arduous task.

Resolved, That this Commission, sensible of the truth conveyed in the preceding resolution, return their united thanks to E. H. Barton, M. D., for his co-operation in bringing to a successful close the deliberations in which we have for a period of more than twelve months been continuously engaged.

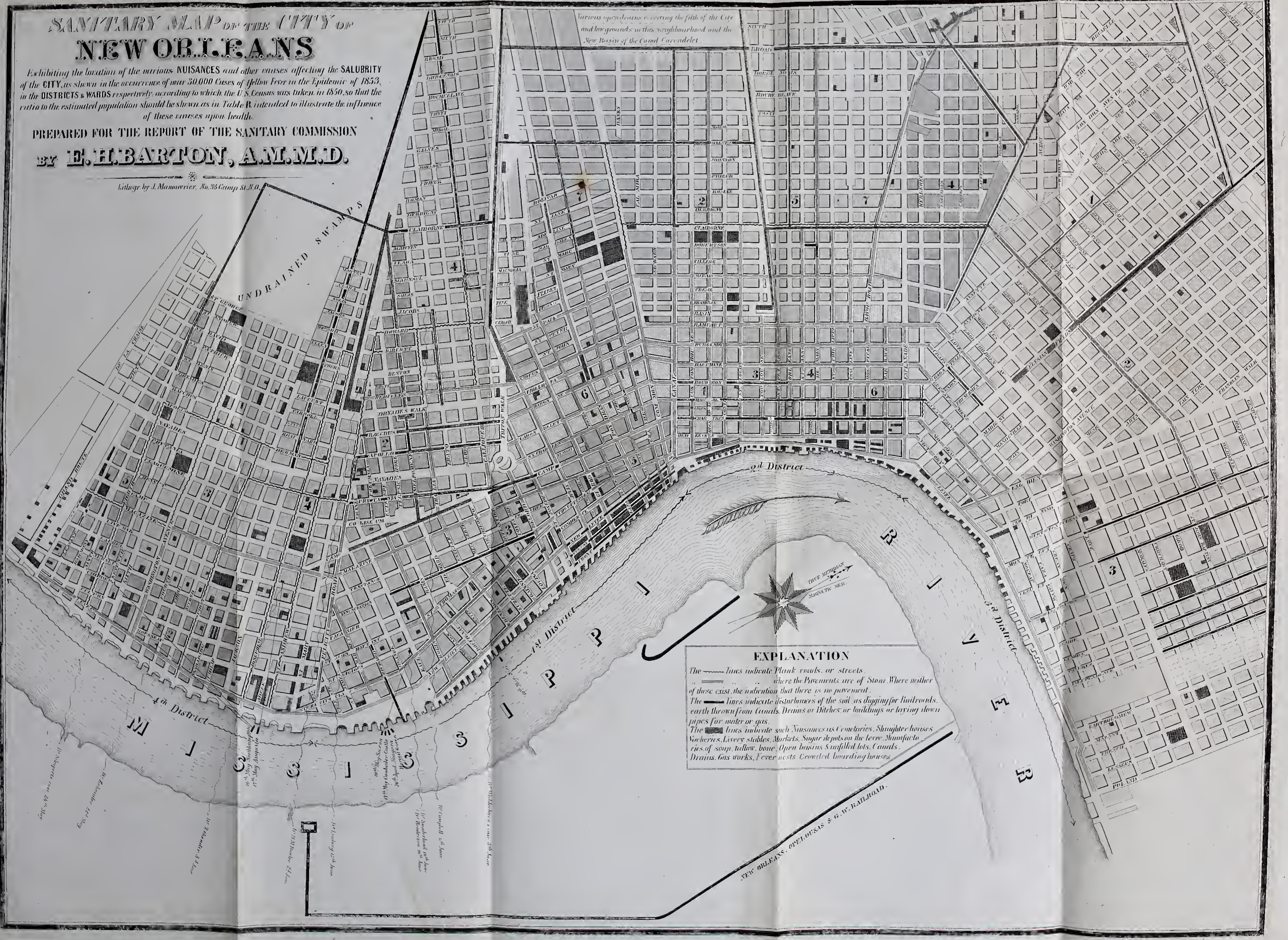
[Signed.] C. D. CROSSMAN,
Mayor of the City of New Orleans, and President of the Sanitary Commission.

A. F. AXSON, M. D.

J. C. SIMONDS, M. D.

J. L. RIDDELL, M. D.

S. D. McNEIL, M. D.



SANITARY MAP OF THE CITY OF NEW ORLEANS

Exhibiting the location of the various NUISANCES *and other causes affecting the* SALUBRITY *of the* CITY, *as shown in the occurrence of over 30,000 Cases of Yellow Fever in the Epidemic of 1853, in the* DISTRICTS & WARDS *respectively, according to which the U.S. Census was taken in 1850, so that the ratio to the estimated population should be shewn as in Table R. intended to illustrate the influence of these causes upon health.*

PREPARED FOR THE REPORT OF THE SANITARY COMMISSION

BY E. H. BARTON, A.M.M.D.

Lithogr. by J. Manouvrier, No. 33 Camp St. N.O.

EXPLANATION

The ——— lines indicate Plank roads, or streets.

" ═══ " " where the Pavements are of Stone. Where neither of these exist, the indication that there is no pavement.

The ▬▬ lines indicate disturbances of the soil, as digging for Railroads, earth thrown from Canals, Drains or Ditches, or buildings or laying down pipes for water or gas.

The ▨ lines indicate such Nuisances as Cemeteries, Slaughter houses, Vacheries, Livery stables, Markets, Sugar depots on the levee, Manufactories of soap, tallow, bone, Open basins & unfilled lots, Canals, Drains, Gas works, Fever nests, Crowded boarding houses.

Various open drains receiving the filth of the City and low grounds in this neighbourhood and the New Basin of the Canal Carondelet.

THE

CAUSE AND PREVENTION

OF

YELLOW FEVER

AT

New Orleans and other Cities in America,

BY

E. H. BARTON, A. M., M. D.,

CHAIRMAN OF THE SANITARY COMMISSION; LATE PRESIDENT OF THE LOUISIANA
STATE MEDICAL SOCIETY AND OF THE NEW ORLEANS ACADEMY OF SCIENCES;
LATE CHAIRMAN OF THE COMMITTEE ON EPIDEMICS OF THE AMERICAN
MEDICAL ASSOCIATION; CORRESPONDING MEMBER OF THE EPIDEMIOLOGICAL SOCIETY OF LONDON; FORMER PROFESSOR OF THE
THEORY AND PRACTICE OF MEDICINE AND CLINICAL
PRACTICE IN THE MEDICAL COLLEGE OF LOUISIANA,
&c., &c., &c.

"*Quod sol atque imbres dedirant, quod*
terra crearat sponte sua."—LUCRETIUS, LIB. V.

THIRD EDITION,

With the addition of upwards of seventy pages of "PREFATORY REMARKS,"

AND A SUPPLEMENT.

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TO SECOND EDITION.

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ERRATA.

"In Special Instructions of the Sanitary Commission."

Insert Alex. Campbell, United States Consul at St. Pierre, Martinique, after Bolivia, in fifth line from bottom, page 5.

In Index to the Report of the Sanitary Commission.

Insert 98 for "68," at sixth line from bottom page 2.

Insert "Death's harvest's fields," after thirteenth line from top page 6.

For "Additional Errata in Body of the Report."

For "members" read *numbers*, in sixteenth line from bottom page 6.

For "Thermometor" read *Barometor*, at fourth line from bottom page 20.

Insert *that* after "proves," at sixth line from bottom page 62.

Insert "and cutting down the banks of the river, and spreading the materials on the streets—and at a subsequent year *wherever* there were these exposures of earth, there and almost there alone, the fever broke out; to follow "offensive," seventeenth line from top page 107.

Read *ever* for "never," at fifteenth line from top page 132.

Additional Errata in the Body of the "Report on the Sanitary Condition of New Orleans."

In table 2, "last of acclimation, for average for United States and British America, for 12.39 read 29.11, page 36.

Do., for average for Europe, for 111.91 read 146.45, page 36.

For "record" read records, at seventeenth line from bottom page 50.

For "The statement of," read *To state*, at tenth line from bottom page 50.

For "from" read *by*, at eleventh line from top page 51.

Erase "condition" at twelfth line from bottom page 51.

Insert *that* after prove, at sixth line from bottom page 62.

For "compels" read *compel*, at thirteenth line from bottom page 67.

For "has written" read *wrote*, at line fifteenth from top page 83.

For "has" read *have*, at line thirteenth from bottom page 87.

Insert *a* before "dew," at line sixth from bottom page 87.

Insert the following note to sixth line from bottom:—"This I have since shown is not the fact, but that it is the effect of high temperature with *saturation* only," at page 88.

For "extends" read *extend*, at line seventeenth from top page 92.

For "it" read *its*, at fifth line from bottom page 94.

Insert *we* after "and," at fourth line from bottom page 94.

Erase "five times that amount here" and insert 627-1000, and on an average of several years more than one-third, at page 172.

Erase "two-thirds" and insert *three-fourths*, at twelfth line from bottom page 202.

Erase "nature" and insert *influence*, nineteenth line from bottom, and for "fellow" read *fever*, page 200.

For "renewal" read *removal*, at fifteenth line from top page 207.

Insert *of moisture* after "amount," at twelfth line from top page 211.

For "secured" read *severed*, fourth line from bottom page 224.
For "parts" read *ports*, twentieth line from bottom page 226.
For "Manoxyrinal" read *Monoxyrimial*, at eight line from top page 239.
Insert *respectively* after "burthens," at ninth line from top page 249.
For "200,000" read "2,000,000," at fourteenth line from bottom page 247.
For "men" read *even*, at second line from top page 247.
After line seven insert "In sandy soils the filth is sinking into the soil, remains there until brought into activity when suitable atmospherical conditions supervenes," page 227.

In Table of Contents to Supplement.

Erase "primitive" and insert *preventive*, in eighth line from bottom page 257.
Erase one of the "theres" at sixth line from top page 260.
Insert *be* at line sixth after "an," page 262.
Erase "two-thirds" at line fifteen from top, and insert *three-fourths*, page 263.
After "extensive," at line fifteen from top, insert *cross streets*, page 268.
Erase "53," at line sixteen from bottom, and insert 54, page 272.
Erase "information," at line eight from top, and insert *inundation*, page 273.
After "instance," next line, insert *of which*, at eighteenth line from bottom, after "have," insert *here*, page 274.
At second line from top, for "atmoic" insert *atomic*, page 276.
Erase "which," at seventeenth line from bottom; for acclimated on bottom line, read *unacclimated*, page 283.

In Prefatory Remarks to Second Edition.

For "Wm. Elam, Esq.," at bottom of page, read *J. M. Elam, Esq.*, page 6.
For Dr. N. W. Gibbes," at botton of page, read Dr. Robt. W. Gibbes, p. 7.
For "countries," at line fourteen from bottom read *sources*, page 8.
For "doubtless," at line ten from top, read *unquestionably*, page 9.
Erase "to" at line from bottom, after "pro-tanto, page 9.
Erase "external" after "disease," line second from top, page 10.
Insert *I* at line fifteen from top, between "me" and "in," page 10.
Erase "and" at line 9th from bottom, preceding "it is," page 10.
For "capalaries," read *capillaries*, in fourth line from top, page 11.
Insert *to* after apply, at tenth line from top, page 16.
For "may produce," read *produces*, at ninth line from bottom, page 16.
Erase "and" at last line from bottom, page 16.

Errata in Prefatory Remarks to Third Edition.

Erase "to" and substitute *and*,' eleventh line from bottom page 11.
Insert *even* after "immunity," eight line from bottom page 11.
Erase "actual," second line from bottom page 11.
Erase "saw" and insert *felt*, twenty-seventh line from bottom page 14.
Erase "form" and insert *from*, tenth line from top page 18.
Erase "ever" and insert *men*, ninth line from top page 37.

PREFATORY REMARKS

TO THE THIRD EDITION.

ANOTHER edition of this Report being required, the reporter embraces the opportunity to consider all the points raised and objections made to the original that he has met with, which have not been satisfactorily replied to in the second edition, and to add such further information in relation to the causes of the occurrences of yellow fever, in other places, as he has been able to procure, in illustration of the principles set forth in the Report.

The Report upon the Sanitary condition of New Orleans was prepared for the use, and under the special direction, of the public authorities. Its main object was an investigation into the *circumstances and conditions causing and influencing yellow fever*, so as to predicate upon them sanitary and preventive measures. It is believed they have been fully pointed out, and that the *causa sine qua non* of yellow fever, as a basis upon which to erect sanitary and police ordinances, are amply laid down. It was not then deemed necessary, in the elucidation of the subject, to go extensively into the *causa causans.* Sufficient, however, was said to indicate the general views entertained. It is now my object to explain them more fully, to answer such objections as have been raised against them, and to fortify assailed points.

My first object is to set myself right—to be thoroughly understood. I have before corrected some of these misinterpretations.

It was never said then—1st. "That disturbing the soil" alone would produce yellow fever—or that there would or could be no yellow fever without it. I likened this to the disturbance or presence of all decomposed or decomposing organic matter—may be aggravated—as there had been no great disturbance without an epidemic *here.*

2d. It was never said that a high dew-point always produced yellow fever, or that it was rife in proportion to its elevation—but that a high dew-point was essential to its existence and duration, and that whenever it fell to a certain degree, the *epidemic* uniformly fell here, and I believe elsewhere, as is shown at Savannah, Charleston, &c.

My position is, that an elevated temperature and dew-point, with much disturbance of the soil, or its equivalent, a large amount of filth and abnormally elevated solar radiation, continued for a certain duration, are all requisite to meet *in combination* (not one alone, nor in proportion to the extent of any one) to constitute that atmospheric condition necessary for the origination of *epidemic yellow fever.* I reiterate it now.

In all the discussions to which the subject-matter and principles involved in the Report have given rise, there are but two upon which there seems now to be any skepticism.

1st. In relation to the requirement of a high dew-point for the origination of yellow fever, and

2d. As to the necessity of some "specific poison" for its existence, "whose nature is extremely indefinite, and whose origin is deemed very obscure."

The respectability of the quarters whence these emanate is entitled to great consideration, and I rejoice at any opportunity to clear up what may have been left obscure—to give farther illustrations and explanations, and to remove difficulties upon a subject on which there has actually been so *little experience*, or rather experiments, as to the direct application of climatic conditions to the origination, production and evolvement of zymotic disease.

It seems necessary for me now to repeat, *in limine*, what I have so often done already, that my remarks apply to that aggravated condition giving rise to EPIDEMIC YELLOW FEVER. Endemic and sporadic cases usually depend upon *local circumstances* and *conditions*, which no general experiments can either prove or disprove.

The *only real case*, brought forward to test the principles involved (of the necessity of a high dew point), is that mentioned by Dr. La Roche, in his truly great work on yellow fever, as occurring in Philadelphia, in 1853. Now here, really, there is no applicability whatever—for

1st. There was *no epidemic.* 170 cases (and 128 deaths) is no more a proof of an epidemic in a population of near half a million of souls, than the appearance of one swallow is to constitute a summer.

2d. If there was an epidemic, the experiments were not made where the disease existed, but a mile or so off, in a high, dry, healthy locality, where a different air must necessarily have existed.

The estimated difference of temperature according to elevation, gives near one degree less for every hundred yards of ascent; it is actually much greater from constant experience. So a difference of elevation gives a still greater difference in the hygrometric condition. The following decisive experiment of Prof. S. B. Hunt, at Buffalo, beautifully illustrates this.*

	Temp. of the air.	Temp. of evaporation.	Relative humidity.	To which add No. of grains to each cubic foot.
At the surface, -	49.	34.4.	.616.	2.634.
At 60 ft. elevation, in belfry of church.	38.	23.9.	.487.	1.677.

All observant people know that there is a sensible difference in the few feet between one story and another, and although the above difference appears small in figures, it is really very great. So a difference in a city from the damp neighborhood of the wharves, to humid slips with an exposed surface at every tide, to a high, dry, well-paved neighborhood, not crowded with houses, must be very considerable. The effect of these elevations on cholera, has been repeatedly shown to be very striking in London, as well as Buffalo, and elsewhere. This is so well known in yellow fever, that it rarely ascends hills, but is usually confined to low places in cities; and indeed, there is often found entire immunity in an upper story. In a low and alluvion country—on the banks of the Mississippi—where all is moist, with the winds blowing over immense swamps, the difference would not probably be so great, although we often find the disease confining itself to one of these localities, without attacking the other, as at Bayou-Sara, Natchez, Vicksburg, &c. Now this is the actual fact, which I have found by actual experiments in this city, at elevations varying from four feet above the soil, to upwards of 200 feet, and I have not found the difference half so great as Prof. Hunt found at Buffalo, in a different geological region.

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* Vide Buffalo Journal for Nov. 1855.

No condition which is not present can be properly referred to as influencing morbid action. This is eminently true of the hygrometric, which may be limited to a neighborhood, lot, cellar, sink, slip, sewer, &c. Of course these experiments, made a mile off, would be about as applicable as the hygrometry of the hills 60 or 80 miles from New Orleans, would be to apply to any supposed influence here.

3d. The dew-point (in the subject of comparison) was taken erroneously, as conclusively shown by Prof. Hunt.* It differs more than 11° from the standard now acknowledged as correct.

After an epidemic has lost its wide, pervading character, from the general causes producing it, having lost their aggravated condition, or intensity, endemic or sporadic cases continue to occur—these become more and more confined to limited localities, dependent upon local circumstances and conditions, and are not cognizable by or amenable to general atmospheric experiments, and would seem to be almost independent of them. This explanation applies particularly to cases of yellow fever, occurring after the thermometer and dew-point have descended below the point I have indicated as their range here, and even after frost. There are few winters in this city, in which more or less of that form of disease, accompanied with black vomit, has not occurred.

So much, then, for the *only instance* where hygrometric experiments have been referred to, to *directly* disprove records that have been made successively here for a long series of years.

It is now proper to meet objections nearer home, and which may have an influence from that cause, which I humbly think they will not be found entitled to, on examination. The record I offer to sustain me in my positions was made, in great part, years before their applicability to the subject before us was thought of.

Long experience and repeated trials to reconcile assertions with recorded fact, have warned me against placing any confidence in averments *from memory* about the existence of any particular kind of weather having occurred at almost any past period, however little soever remote. I say this without impugning the veracity of any one. For instance, it has been stated here in the public prints as an objection to these views, of humidity being essential to the existence of yellow fever, that "during the epidemics of 1837, '39, and '41, it was remarkably dry." On recurring to the record, it was seen that although the *aggregate* for the first year showed a very small average for the entire year, the yellow fever months exhibited an unusual quantity, and that during the years 1839 and '41, not only were the yellow fever periods remarkable for immense precipitations, but they showed in the aggregate of each year, an *amount of rain rarely if ever equalled in this country.* Precisely the same occurred in relation to the statement of "the deluges of rain falling in 1825," and onwards to 1829—mentioned in the "Supplement," page 264. As I could, at the time of answering, obtain no intelligence of any record of rain being kept in New Orleans at the period referred to, I could only reach my results by the very laborious method therein pointed out—being convinced for the reasons set forth, that the whole period had been *remarkably dry.* That opinion has lately received a most remarkable and unexpected confirmation from Mr. D. Blair, of this city, who states to me, that he then kept a rain guage, which was a very fine, costly one, from London, and the precipitation was recorded in a book, which has been since lost; but it was so remarkable as induced him often to refer to it, and that the rain during the first mentioned period was so small in some of the years as only to amount to 27 inches, (I have never recorded one less than 39 inches,) and during 1829 there fell 90 inches! the heaviest amount of rain which has ever fallen here, or recorded by any authority entitled to credibility.*

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* Vide supra.

a But the statements to which I now more particularly invite attention were those made by Dr. W. Stone, of this city, before a learned body of physicians of New York, in which he expressed the opinion that "moisture was not essential [for yellow fever], for it raged equally in the high lands and the low—where the *dry trade winds blow*, or where the air was damp."†

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* It is true a journal was kept here by the late Mr. Lillie, keeper of a store for nautical charts, and published in the New Orleans Medical and Surgical Journal, the editor of which I often warned against its fallacious statements—a record so apocryphal that it would not be even referred to, had it not been quoted by Dr. La Roche, to show the immense quantities of rain some years precipitated here without very seriously impairing the public health, and he refers to this journal as proof of it, in recording the outrageous amount of 127,247 inches as having fallen during 1848, while my own rain guage for half that year, and that kept for the War Departmhnt for the other half, only amounted to 49,144 inches! Ex uno disce omnes.

There is, however, another serious error made in this journal, which I shall refer to, as it has been quoted by Dr. Drake, and gives foundation for another erroneous opinion of our climate, in stating its main temperature more than three degrees (3.31) higher than it is. He made it 71.18—my own observations make it 67.84. This is corroborated by the temperature of the artesian well in Canal street.

b "A continued heat in a certain high degree was once supposed essential; but this is now disbelieved, for in 1847 it commenced early, in '53 earlier—say in latter part of May or June, when there was no steady heat. We had a remarkably cold spring that year."

c "This year [1855] it was very dry, and the sugar cane died for want of moisture, and all were suffocated by dust when the disease first appeared."

d "It appears in *all climates* that are *almost perfectly healthy*, where there are no remittents or intermittents, nothing bnt accidental sickness."

e "Filth does not appear to give any virulence to the disease."

"Many who investigate yellow fever form theories and afterwards hunt for facts, and they are apt to get hold of instances which favor their theories. These when arranged in a catalogue appear quite formidable, but when investigated, quite a different result is obtained."

These statements I would not have noticed, had they been derived from an authority less distinguished; but coming from the source, they did, and uttered ex cathedra, before a body of medical savans, in the face of records and experiments, most of which are now before the world, I am in duty bound, not only out of self-respect, but what I owe to my colleagues, to defend the positions I have ushered forth with my name.

a. Contains nothing but assertions, and *all equally true!* whether of the "Dry tradewinds" which no one ever saw in this hemisphere, or "where the air was damp or dry," and is met by the statement I aver to be true, and which I will prove presently, that yellow fever *never originated but with a high dew-point.* The presence or absence of rain is not sufficient to indicate moisture or dryness, as I will soon demonstrate.

b. A high temperature of many weeks, if not of months duration, is essential for the origination of epidemic yellow fever, as *every record of its appearance* will most abundantly testify.

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† Vide Records of the "Academy of Medicine" of New York, published in the New York "Medical Times" for November, 1855, No. 556.

The first published record of yellow fever in 1847, occurred in the week ending the 10*th of July*; but the fever did not become epidemic until the first week in August. In 1853, there were two cases in May—31 in June; but the fever did not assume an epidemic character until about the *middle of July*. So far from being a "cold spring that year," it *was exactly the reverse*—the average temperature being more than one degree higher than any spring *for eight* preceding epidemics!

Now, although the spring of '53 was warmer than those of preceding epidemic years, yet I draw no deduction from it, because it did not exceed the average of the preceding thirty-five years. So the temperature of a preceding spring can hardly form a proper basis to predicate an approaching epidemic on. Neither, on examination, can the temperature of a preceding winter. Epidemics have followed mild as they have severe winters, as well as springs,—neither, then, furnish a clue to enable us to announce, with any certainty, the future yellow fever. An abnormal amount of solar radiation is probably the most conspicuous in the line of meteorological causations. There is doubtless a law of definite duration wherever time is an important element, as it is in yellow fever; yet here the period of maturation cannot be at present defined. High temperature alone, although indispensable, is hardly so important an element in the production of yellow fever as moisture. Of this—one of the most influential agents, it is mainly required that it should exist but a few weeks before, and during the disease. These *views are founded upon, and sustained by an examination of all the records which existed antecedent to, and during all the years of our epidemics.*

So far then as the temperature and moisture of the air is concerned, no anterior condition of either—occurring long before-hand, can, with certainty, assure us of what is in future (here). The combination to produce yellow fever must be formed during its incipiency and not long previous—if experience here is to be a guide. This is corroborated by the fact, well known, that an unacclimated individual, perfectly healthy, visiting a place where epidemic yellow fever is reigning, is sometimes attacked in a few hours, and from that to a few days; at all events, requiring but a brief duration to produce its influence, instead of months of preparation.

The foundation of all scientific prediction is, that an occurrence once happening, dependent upon certain well ascertained contingencies, may be foretold upon the basis of their repetition; thus it is known that a certain flower will bloom when the sum of the squares of the daily mean of temperatures reaches a certain point from the last freeze of winter; for instance, the common lilac blooms, when this sum reaches 7607° Fahrenheit; and again, the result will follow, if certain causes known to be the productive of the disease, (with the additional element—constitutional liability) unite in the requisite proportions.

The prediction of the epidemic yellow fever of 1853, was not and could not be on meteorological grounds alone, for the reasons above stated—they were not and could not be known with sufficient definiteness beforehand; the contingency of *their* happening was the only doubt entertained—for nearly all my grounds were based on the presence of the other blade of the "shears"—the terrene, and such had not failed in the preceding sixty years. It was upon this that I was enabled also to announce, before-hand, the expectation of the epidemics of 1854 and '55.*

---

* I make the following extract from the great work on yellow fever of my friend Dr. La Roche, ii., p. 405:

"To the credit of Dr. Barton it may be stated that so early as the 6th of June [last week in May] of that momentous year, he predicted the forthcoming fearful mortality of 1853. At a meeting of the New Orleans Academy of Sciences held that day, he exhibited a chart of the mortality of the city since 1787. Among many other interesting facts developed by the chart, [vide chart A], he called attention to some recorded above; 'and to the inquiry as to the probability of an epidemic during the coming season, he replied, that judging from the past, if the facts exhibited by the chart were not merely coincidences, he was compelled to apprehend that the present year would be MARKED by a great augmentation of disease. The simultaneous construction of four railroads in and around the city—the digging of a new basin of vast extent in the rear of the city—the enlargement of the canal Carondelet—the open sewers—scarcity of water—insufficient drainage, and the practice of spreading over the streets the horrible filth of the gutters to fester and reek in the sun—if all these are continued during the hot months, with the proper meteorological condition, our exemption from a SEVERE EPIDEMIC would almost seem MIRAOULOUS.' "*

"Here let it be remembered, is an epidemic predicted on data of a positive kind by an experienced and observant physician; and when that epidemic arrives, some are found to attribute it to importation from abroad, and quarantine measures are suggested to guard against the further introduction of the disease."

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* Published proceedings of the New Orleans Academy of Sciences, i: p. 11.

The spring was dry, it rained but 4.790 inches, and the rainy period was only seven days and seven nights. But then during June there fell a larger quantity of rain than had fallen for ten preceding Junes, and including the following months of July and August not less than 17.559 inches of rain were precipitated, and it rained on *thirty-eight days* and *nine nights!* The first cases of yellow fever which were recorded or published, were not until the week ending the 9*th of July!* The average relative humidity for June during which it rained more than half the time, was .774, average dew-point 70.72, average amount of moisture in each cubic foot was 8,289 grains—near our maximum. This statement, copied from the record, requires no comment.

The yellow fever occurring in this city early or late, depends *always* upon meteorological conditions. It never makes a turning point, nor does it cease as an epidemic in New Orleans *without a meteorological change*, and a reference to the records of every yellow fever epidemic which has occurred in this country for more than half a century will sustain me. And again, the same want of precision is exhibited in the assumed period of the existence of epidemics. This period is known only when the causes productive of it are of such an aggravated nature as to influence the mass of cases—when it becomes the predominant form of morbid action—when other diseases either give way to it or wear its livery, and evidence of its existence is exhibited on the vegetable and animal creation beyond our race. A few cases may occur months before the actual epidemic can be declared—nay, exist all the season, or all the year, and there be no epidemic. The period of their duration is just as variable. The actual extremes have varied from fifteen to ninety days.

d and e. Require no answer; it is charity to suppose that he has been misquoted, if not, our Northern brethren must commence studying the therapeutics of yellow fever, and well then may our countrymen be alarmed at their future prospects, whether high or low, mountain or seaboard, cleanly or filthy? The subject is fully treated in the report, and especially in the supplement.

f. The only reply these ad captandum remarks call for is, 1st. That "investigation," instead of giving a different result, HAS ONLY CONFIRMED

This prediction (see note, page 16,) was given in more ample details to my personal friends than to the above scientific body.

IT! And 2dly. In relation to "forming the theory first, and hunting up the facts afterwards to sustain it," it is due to the late Sanitary Commissions to say, that at one of its sittings near the termination of its labors, the question was asked me, if I could state what those metereological elements were to which I had attributed so much efficacy. I replied that I thought I could. It was then only that I re-examined all the records of epidemics in which the meteorological elements had been recorded,—the results are in the table at page XII Introduction. The *facts* then *preceded* the theory, as they always should; the deductions are legitimate and fair,—post hoc et propter hoc form the "formidable catalogue," and the generalization from them has thus far withstood the test of scrutiny and time.

It seems to me that until actual experiments are undertaken and carried through, with a view of ascertaining the precise meteorological elements existing during yellow fever, which my own so carefully made for a long series of years,—of a high dew-point, and high solar radiation, &c., I, with all due deference, think, it would be modest, if not courteous, for those *who have never made an experiment on the subject*, to defer dogmatic remarks and unwarranted assertions, that are as unbecoming as they are undignified. These reliances upon recollection for meteorological conditions may be simply termed record *vs.* recollection—exactness *vs.* looseness—fact in the place of fancy, and clearly demonstrate that they are entitled to no reliance whatever in a scientific discussion.

Nowt he records will bear me out in the averment, so far as they have been made, that no epidemic of yellow fever has ever occurred in this country, and I much doubt, if in any other, without a high dew-point,—that is, without a high degree of moisture in the atmosphere in such district; this depends upon the temperature, the quality of the soil, and its mode of precipitation. The dew-point is a measure of this condition, and a reference is made to it throughout the text, as the standard and index of that condition. The bold, if not reckless averment, that the "season is dry and parched," which is a mere relative condition, without this proof of it, must be considered now only a proof of ignorance. And here I may state that there is a wide distinction between "*drought*" and "*dryness*;" they are, properly, not correlative terms; there may be "drought" without "dryness," and dryness without drought. Drought strictly means a long absence of rain without reference to the hygrometrical condition.

These explanations are obviously called for to correct or rebuke the loose manner in which the terms drought and dryness are often used in speaking of the character of seasons. If they were used in their strict signification and the indications of the hygrometer, the true test of the condition, professional men would no longer misunderstand one another—they would then reason from the same premises, and the true principles of etiology would be appreciated. Let us illustrate these principles by recorded facts.

Dry periods and wet periods, I repeat, are altogether relative—they are dependent upon conditions just pointed out—they cannot be altogether dependent upon the amount of rains falling. Rapid, although heavy rains, seem, and actually do deplete the air, and leave it, as ascertained by the hygrometer, drier than before; rains that fall at short intervals, with a high temperature and hot sun intervening, make it very *humid.* Again, a clayey soil will retain it on the surface, and a sandy soil absorb it. A moist air is known, even when supposed to be dry from rain not falling, by the occurrence of mould upon leather, books, &c.—from its influence on various saline substances—from what is denominated a "funky" smell—from stagnant air, &c., and these I have never seen absent during yellow fever.

It is an observation of many years anterior to the special exactitude by the hygrometer, that fogs hanging over undulating and irregularly elevated sections of country, influence their salubrity. Prof. Wistar remarked it more than half a century ago, in the vicinity of Philadelphia, and in the malignant fever in Wilmington in 1809, it was specially noted that wherever the fogs were heavy the disease was most rife; indeed, this is a well-known fact of almost universal observance. Fogs denote saturated, or nearly saturated atmospheres. Rains rarely ever accompany fogs—the line of malaria, as it is called, above the Pontine marshes, is precisely marked by these very fogs—it forms the limit of the "poison," if you will—it is, in plainer language, the necessary constituent of their existence.

The proofs that the amount of moisture in the atmosphere is not sufficiently indicated by the amount of precipitation, has been most thoroughly shown by Prof. S. B. Hunt, of the University of Buffalo,* "during the months of June, July and August, 1855," says he "in the city of Buffalo there have fallen near 14 inches of rain, while the atmosphere has been far drier and the dew-point lower, than during the drought of the summer of 1854, when only about 4½ inches fell during the corresponding time." This I have often noticed.

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* Vide Buffalo Med. Jour. for Nov. 1855, p. 350.

The assertion so often made, that the atmosphere must be dry because large amounts of rain have not fallen, is met by the experimenter by actually showing with the hygrometer what that state truly is—and this is often conspicuous during long droughts, and is farther shown by the heavy dews that now fall, and hardly a surer sign of rain can be given than these being withheld. A few illustrations extracted from my meteorological journal will make this very plain. Thus, if we compare the winter of 1852, during which there fell 7.476 inches rain, with that of 1850, when it amounted to 14.556, we find the relative humidity in the former to be .816, while in the latter it was only .776. Again, the summer of 1852, with a precipitation of 7.685 inches, has a relative humidity of .861, while that of 1849, with a precipitation of 24.464 inches, has but .877. The autumn of 1850, with a precipitation of 3.441, has a relative humidity of .759 and 7.088 grains of moisture to each cubic foot—while the autumn of 1853, with a precipitation of 17.257 inches, has a relative humidity of .843, and but 6.893 grains of moisture to each cubic foot.

Our driest year—1852—during which there fell only 39.968 inches of rain, when compared with one of our wettest—1853—during which there fell 62.641, is as follows:

During 1852,	Average annual humidity,	.834.	No. grs. in each cubic foot,	7.055.	Average dryness,	6 09.
" 53,	" " "	.839.		6.714.		5.70.

Again. No interval of drought in a period of 20 years, during which I have examined my records, *exceeds* 26 *days*—notwithstanding the often-repeated statement, "of months in which not a drop of rain has fallen," &c., and this has been *but three times;* and of periods of 20 and over (excluding the above),there have been but 8. During these long droughts, the dew-point has sometimes been higher (indicating more moisture to be in the air) than at neighboring periods with the usual precipitation. For instance, in April, 1841, during a drought of twenty-three days' continuance, the average dew-point at midday was 63.63, while during the seven days in which there were several rains, amounting to the large quantity of 7,250 inches, the dew-point actually fell to 61,60. I have records of several instances during which the dew-point was higher during droughts than after rains, and there is often more moisture in the air than during *heavy* rains, and these illustrations might be greatly multiplied.

Hence, then, the foundation as well as the proof of the remark with which I set out, that wet and dry seasons are relative, and the humidity is not altogether dependant upon the amount of precipitation, and in estimating the more or less moisture of a season rains alone are a most fallacious index.

Nevertheless, by reference to the actual records kept here for more than thirty years, the *uniform facts* are, that a large amount of rain always falls during our epidemics, and in that month in which it reaches its culminating point, there is usually the greatest precipitation, and if there is any single exception to this, it is that it occurred in the month *just passed*, but *never* in the *succeeding month.*

It has never been stated by me that the dew-point was injurious *in proportion to its elevation* in yellow fever as I did of "sun-stroke," for this is the very weather required for that, with a high temperature. But that a high dew-point was *essential for its origination and continuance as an epidemic*, and I have yet to learn that yellow fever *ever occurs as such without it.* But then, as it is not dependant *upon it alone*, the several statements of a high dew-point without the disease appearing are not at all applicable, this being but *one* of the conditions, *sine qua non*, to its appearance, and it *never* depends upon one alone. But wherever proper attention has been paid to the subject, a large amount of moisture has *ever* been shown to be present, and the late disastrous epidemic at Norfolk has as well illustrated it, as at Savannah, Charleston, Augusta, and at this place.

If humidity is not necessary for yellow fever, and even a high temperature, there is no reason why it should not prevail in various northern and elevated parts of the United States where other conditions exist. If great humidity was not essential for sun-stroke, we should have it of frequent occurrence in the mountains where I have seen the thermometer rise in the sun to 145°, while in the shade it was not much over 70°, and the dew-point a little above 60°.

Temperature influences much the effect of humidity on the body, the exact amount requisite for health has not been shown, I shall presently indicate what is enjoyed here during our periods of least mortality. I have endeavored to procure it of most other cities, not with sufficient success, equal to its importance, for certainly no other meteorological condition has been pointed out which so much inflences health. Baron Humboldt remarked of Cumana "that it was the hottest, driest, and healthiest city in tropical America." If we proceed to a different temperature and climate, and witness the remarkable health enjoyed in England and Holland, enveloped in their almost perpetual fogs, and then notice the great difference in the health of the same people emigrating from that temperature which is low to this, which is very high, the mortality resulting from it is shown to be greater than that attendant on any other.*

Probably no climate in America has been so little understood as that of New Orleans. Although this is not the place for its defence, it comes within the range of my observations to correct some errors. It is cooler than Galveston in summer and warmer in winter, and has less amount of precipitation than any recorded position south of Charleston. The mean annual temperature is 67°.84; the dew-point varies from 80°.9 to 7°.4; the mean annual dew-point is 61.96; the mean compliment of the dew-point or drying power, for a series of years is 6.19; the extremes being from saturation to 41.9, and the mean amount of moisture in each cubic foot is 6.848. This remarkable peculiarity of climatic condition is mainly due to the defensive position of Lake Pontchartrain to the north of it, moderating the winter's cold and snmmer's heat, and the vicinity of the gulph and large arms of the sea, all tending to satisfy the mind that with proper clearing, draining, and rigidly enforcing sanitary measures, it is susceptible of vast advancement in its sanitary condition.

On a careful analysis of the mortuary and meteorological records here for twenty or thirty years back, there is a conjuncture of conditions when nearly as great salubrity is enjoyed as elsewhere; that occurs with a temperature between 60° and 65°, and dew-point from 50° to 55°, with humidity about .750, and having about five grains of moisture to each cubic foot of atmospheric air. This is sufficient to prevent that combination spoken of in the text, and constituting a branch of the "shears," and it is remarkable how near this is to the mean of this climate, both in temperature and hygrometrical condition just noted.

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* *Vide* table at page 36 in the body of the report.

It is the result of individual experience all over the world, that our main dependence for health and enjoyment is upon atmospherial conditions, and there is little doubt, but there is some definite amount of thermometriical, hydromatrical, and other atmospherical ingredients, that is required for the highest conditions of these everywhere, and for every person, for each climate—experimental observation should determine what these are. Different degrees and combinations, we now know, from their disastrous effects, how injurious they are; they have taught us, for instance, that a combination of great moisture with a high temperature, with filth, is much more fatal in its influence on the body than where the temperature is low,—that maxima of moisture and temperature produce the most rapidly fatal of all diseases—"sun stroke,"—but that in a medium between these extremes, the highest measure of health is enjoyed. I have said above what it has been found to be here. Probably the temperature, most agreeable and conducive to health and enjoyment in temperate climates, is from 60° to 67° with a dew-point from 58° to 62°, and somewhat lower as we proceed north. During the worst period (average of about a week) of the epidemic yellow fever of 1853, the temperature *averaged* °77 40, and the dew-point °74·70, and radiant temp. °131; while the extreme of the first was °91, of the 2nd °79·4, and of the sun temperature °148. In England, one of the healthiest climates in the world, the average annual temperature is about °51, and dew-point about °43. Now I lay it down as a principle, after a very laborious examination of many other climates than this—from which, I think, there will not be found a very wide departure—that unless some unusual cause for mortality shall exist, that the *mean annual temperature and humidity* of an average healthy climate, is *nearest approached* in *those* months *which habitually have the least mortality*, and this is probably the law.

It is shown in the text that all forms of fever are dependant upon atmospherical conditions mainly, and it is, by an attentive examination of their laws, that these influences can be thoroughly understood.

An indisputable proof of climatic influences upon yellow fever, is furnished in the remarkable fact, mentioned in the report, as noted by those philosophical observers at Rio and other places, and doubtless would have been exhibited everywhere if proper observations had been made; that, wherever it has appeared for the *first time*, it has *ever been preceded by changes in that climate.* Similar changes have probably occurred on its departure. This shows how inapplicable the terms "indigenous" and "exotic" are, when applied, as they have been to yellow fever and other febrile diseases. They are all owing, mainly to climatic influences, and arise from combinations of these and other conditions wherever they exist in the proper proportions for their developement, as will be shown presently, and require no other "seed" —"germ," or "sporules" to "hold over," or for transplantation.

Yellow fever, as it has sometimes appeared in the rural districts in the south-western parts of the United States, would not seem to be governed by those strict laws which have been found so invariably to characterize it in the city. This, I suspect, is apparent only. In the remarks made upon this subject, I have most emphatically limited myself to that aggravated condition constituting its *epidemic grade* only, and in all the examinations into these occurrences which I have been able to give, I have not come across a single instance to shake my faith. Sporadic, endemic, and incidental cases have occurred, both here and elsewhere, which have depended upon local conditions and great individual susceptibilities, that are beyond the influence of any general law or cause, and should not detract from their value, or the influence may have been already made by exposure, and afterwards developed by circumstances. Thus cases have occurred here in every month in the year, without partaking at all of an epidemic character,—it is the same in the rural districts,—frost upon frost has occurred, and still some cases continue; but it is believed no *epidemic*,—there is no proof of that wide-pervading influence which characterizes this. Precisely the same remarks are applicable to cholera, where this is said to occur in a temperature near or even below zero. It only means that this is the temperature *out of doors*—forgetting that the temperature within is almost or quite tropical! with all the filth and want of ventilation proverbial in Russian dwellings, where these have occurred.

In stating the meteorological elements deemed necessary to provoke the condition essential to the development of yellow fever, it is proper to say, that it is sometimes as great, or greater, than is met with at the period of *maximum intensity*; that a particular day cannot be stated when it actually first commences, as such, and the same as to its decline, and hence it is my custom in estimating these periods, to take an average of from five to seven days, but the maximum does not often require so large an average—often the very day can be fixed on, as in 1853, '4, '5, from which the decline progresses, more or less regularly, to its termination, dependent upon the condition of the weather. This change is nearly always accompanied by a very sensible decline in the dew-point, in the two latter years particularly. This culminating point of the epidemic never occurs at the same period during any two successive epidemics, although this takes place more frequently in September than in any other month. In 1847, '53, and '55, it occurred during the latter part of August. But I repeat, that no great change has ever been produced in this disease, without some very sensible alteration in some of the meteorological elements,—usually the dew-point; in 1853 it was more especially in the solar radiation.

It is further proper to explain in relation to the pressure of the atmosphere on yellow fever, that it does not appear as obvious, from the table at page 13 "Introduction," as the real facts would justify. Previous to 1848 the barometer I used was not standard, it was the best I could procure here; on setting it aside for the standard instrument in use since, I omitted, in the hurry of preparing my calculations, to add nearly 2-10ths to its readings, this being the difference between the former and the latter instrument, and would make the record to correspond nearer to the statement in the text—viz., that these epidemics occur during period of high atmospheric pressure.

In the application of these important meteorological principles we have the true key to the explanation of phenomena, which heretofore have been the constant theme for controversy among professional men;—why, for instance, with the exposure of 50,000 victims annually, formerly, in the high and dry city of Mexico in their inhuman sacrifices, and of 40,000 offered up at the dedication of the great temple, whose altars and vicinity were ever reeking with human gore, pestilence did not immolate the population, as it would in this humid country;—why occasionally, only, a mortal fever follows exposure of the dead on fields of carnage, and *sometimes* depopulates whole villages;—why a dead whale cast upon the coast of Holland has, by its putrefaction, created a pestilential fever; and why it then produces no effect;—why Captain Cook with his system of dry rubbing the decks of his vessel, instead of deluging them with water, (as is the more common custom,) circumnavigated the globe without losing but one man; why it is so fatal watering a vessel on a pestilential coast—those alone suffering (and uniformly) who remain during a night on shore.* Why fires in our rooms in the wet and sickly autumns of the lower countries tends to retain our health, and thus the salubrity of our negroes is preserved under their habitual system of kindling great fires in their cabins ;—why woollen clothes, from their *attraction* for moisture, are so retentive of fomites and offensive smells ;—why, in fine, is it *that filth and offal of all kinds, nay every species of decomposition, appears at times entirely innocuous*, but at others shows its deadly fatality. We can thus explain how it is that digging and disturbing the soil is not so injurious in a *dry atmosphere* as in *humid hot weather.* Medical history teems with similar examples which it is useless to multiply, for it is clear that this is the only reasonable interpretation, as it applies with admirable fidelity to all these numerous variations and reconciles so many apparent contradictions. And here we could draw a most useful and profitable lesson in our own city, not only for the purposes of health on which I have enlarged so much in the report, but for domestic and commercial purposes. Excess of humidity is the greatest embarrassment our situation exposes us to, these have been mostly mentioned in the text, with the mode of remedying them.* The finest goods become spoiled by passing a summer in our stores, built with an utter disregard of all our climatic liabilities; flour sometimes sours in a few hours, while with a careful watching of the hygrometric condition such a loss (by purchase at least) would never be experienced. By watching the meteorological conditions, as occurring in this city, a very near approximation can be made, at least sufficient for all practical purposes, to that of its conditions throughout (probably) the entire delta of the Mississippi; hence the condition of the crops, the rise of the rivers, and the early or tardy reception of that crop in market, can almost always be foretold with very tolerable precision. By neglect we thus disregard the teachings of science and the lessons of experience, sacrifice health, and with it the reputation of our city, and the wealth and enjoyments of life.

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* I have received, since the above was written, the following interesting letter from a distinguished and long experienced Captain in our Navy, as eminent for the strictness of his discipline as far as the salubrity of his men, and respected and beloved by all.

FREDERICKSBURG, VA., November 8th, 1856.

MY DEAR SIR :—As the late cruise of the Frigate Constitution on the coast of Africa, has attracted some attention on account of the unprecedented good health of her crew, I attribute that happy result principally to the following circumstances :—"The crew having been clad in flannel;" "*the ship kept as dry as possible;*" "letting no water from the sea into the hold;" "the galley (the cooking apparatus,) being on the birth or lower deck;" "and the most rigid enforcement of the Sanitary Regulations of the Navy Department." The decks of the ship were not permitted to be washed except in good weather, and then only when necessity required it, so as to keep her clean—after the lower deck was done (which was frequently with hot water)—the cinders from the coal at the galley were put in hanging stoves about different parts of the deck. The old practice of letting water in the hold was entirely abandoned, she was pumped out twice every day, so as to keep her dry below, and from that usage we never had any smell. During the cruise of the Frigate Macedonian in the West Indies in 1822, when I was attached to her, the contrary was the *usage*, even in the harbor of Havana, the fatal consequences are well known, the yellow fever broke out, and in three months we lost 105 of our crew with that disease. I met, some years after that in the Pacific, Captain Coglan, of the British Navy, who informed me, that during the French War, he was in a frigate on the West India Station, that they kept every thing dry, and her crew remained healthy ; the rest of the fleet had the yellow fever, caused by their continued wetting. The galley being below added very much to the good health of the ship, not only keeping her dry, but purifying the atmosphere, the only objection urged was, that it was more difficult to keep it clean on account of the darkness of the lower deck. The Sanitary rules of the Navy Department which were in force, did not permit any person to be on shore after sunset or before sunrise. I have briefly submitted to you these remarks relative to the cruise, if they can be of *any* service in *any* way to you, I shall be much pleased.

I remain, with great regard and friendship,

Yours, &c.,

JNO. RUDD.

DR. EDWARD H. BARTON.

Here there are precisely those "certain meteorological conditions" which the philosophical sagacity of the late Professor Harrison, of our city, deemed alone as needed to explain the phenomena required for the development of epidemic yellow fever, to give activity, force and life to the second or terrene condition. We several times conversed upon the subject, but the experiments were not sufficiently numerous at that time (1843–4) to authorize conclusions; and it was not until the disastrous year 1853, that they became extensive and unequivocal enough to justify fully the conclusions now derived from them. The truth at last burst upon us, and the aggregation of antecedent and subsequent experiments now fully authorizes us, we hope to say, there is no longer any room left for reasonable doubt.

I trust now, after this minute if not tedious recital of facts, that the position in the report of the necessity of a high dew-point for the existence of yellow fever has been fully sustained. It might have been corroborated by illustrative facts from other regions, but they were deemed superfluous. Detail, exactitude is, at once, the creation and creator of modern science, indeed there is no science without it;

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* And for farther illustrated see my report on the mortality and meteorology of New Orleans for 1855.

in the language of Lord Bacon—"It is leading mankind to particulars." Science is created by laws, and these are formed by the generalization of a "multitude of facts repeatedly and accurately observed and carefully noted." The same great authority has said that "he that cannot contract the sight of his mind as well as disperse and dilate it, wanteth a great faculty." Detail and generalization in all things are equally subservient to master minds, and their intimate personal history eminently shows it.

It affords me much satisfaction to state, that since the last edition of this work was issued, much farther testimony has reached me, that the meteorological and terrene causes of yellow fever, laid down in the text, have been most fully borne out in a variety of places, corroborating the facts and principles advocated. As full details of these as might be desirable, it has been found impossible to procure. So few medical men keep minute meteorological journals, or pay but a passing attention to the weather, or note improvements, changes, or passing events, that special exactitude is rarely to be found. The following, however, may be relied on as far as they go:

The recent (1855) fever at *Memphis*, Tenn., if not mainly owing to the cutting down and levelling the streets in the spring and summer season, has certainly been greatly aggravated thereby.*

At *Charleston*, in 1854, there was a filling up of lots in the neighborhood of the Marine Hospital, and disturbance of the streets for the purpose of laying down the gas-pipes, and repairs. But the most remarkable similarity will be found in the meteorological elements, which prevailed during the successive periods of the epidemic, and which will be found to correspond in all essential particulars (so far as they go) with those prevailing in New Orleans and Savannah, as exhibited at page XIII of the "Introduction," and page XIV of these "Prefatory Remarks," although the hygrometer was recorded only once daily (at sun-rise). These are comprehended in the following table:

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* Professor Merrill.

Meteorological elements prevalent during the existence of the Epidemic Yellow Fevers in Charleston, in 1854.

Periods of	Date of these.	Av. Thermometor at	Av. Temper. in Sun.	Av. Dew-point temp. at sunrise at	Av. Barometor at	Predom'nt Winds at	Av. Humidity at	Av. Drying Power at
1. Commencement,	between Aug. 30th & Sep. 3d	80.86	none	75.40	30.259	S. E	.845	5.46
2. Maximum intensity,	Sept. 18th and 25th.	73.33	made.	70.16	30 279	N. E.	.902	3.17
3. Decline,	Oct. 26th and 30th.	67.22		63.33	30.176	N. E.	.882	3.89

After much trouble, I have to express my regret that I have found it finally impossible to procure the meteorological or mortuary data prevalent at *Augusta* during the epidemic yellow fever of 1854.

Norfolk and *Portsmouth*, although surrounded (as it were) by government establishments—proper meteorological records, it is believed, were not kept during the existence of the epidemic. Nevertheless, I have procured from eye-witnesses information which leaves not a doubt that the same kind of weather which characterized yellow fever seasons elsewhere, was eminently exhibited here,—viz.: that the temperature in the sun was extraordinarily high and oppressive, and in the shade varied from 85 to 95 for more than two months; that the chilly north-east wind greatly augmented the cases; that the air was close, stagnant and humid, so much so as to render it difficult at times to light a lucifer match; that a thick green mould gathered almost everywhere, even on counters and shelving, sometimes to the extent of half an inch in thickness; that the rains were frequent in July and August, but instead of cooling the atmosphere, were invariably followed by more intense heat; and the disease was finally put an end to by a heavy rain and north-west wind, lowering the temperature, early in October. The epidemic influence was farther shewn on fruit, which prematurely rotted in the trees, many of the leaves of the shade trees changed color and withered at an early period; not a bird was seen within the city limits, and many dogs and cats fell victims to hemorrhages from the nose and mouth. The noxious effluvia of the city was so concentrated and offensive as to be perceived far beyond its neighborhood.

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* For the materials to make this Table, I have to express my obligations to that lover and promoter of science, the Hon. M. King, of Charleston.

With regard to the coefficient or terrene causes of this fever, investigation has not left a doubt on my mind. The intelligent letter of the United States Consul at Vera Cruz (J. S. Pickett, Esq.,) whose experience in yellow fever should attest his qualifications as a most competent witness, and who was incidentally a passenger in the much-abused "Ben. Franklin," to whose arrival from Porto Rico the fever has been attributed,—I give below.* On a careful perusal of that letter, every candid and unprejudiced mind must fully exempt that vessel from having had any agency in the origination of the fever, and consequently from its being imported from abroad.

It has been clearly demonstrated by those who have thoroughly investigated this subject on the spot, that so far from this ship having originated this fever, that cases occurred some days before her arrival at Gosport; that of all the men who worked upon her, and they were numerous, at this filthy spot only two were attacked with the fever, and they were exposed to other much greater liabilities than this vessel af-

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VERA CRUZ, September 21st, 1855.

* *To the Editor of the Norfolk Herald*:—From the reiterrated statements in the public press of the United States, the impression has been made that the awful mortality at Norfolk and Portsmouth is traceble to the steamship Ben Franklin, which arrived at the latter port from St. Thomas early in June.

As such an impression is calculated to mislead and baffle scientific research as to the true orgin of the plague now desolating those cities, suffer me to disabuse the public mind by stating a few facts

The Ben Franklin left St. Thomas for Now York on the 27th of May, with thirty-three passengers—men, women and children—most of them unacclimated persons. The second or third day out several of the crew and firemen were on the sick list, but whether from rum, fatigue, or malingering, (commonly called "sogering,") I shall not pretend to say. Certain it is, there were no cases of yellow fever among them, and the writer has, he thinks, seen enough of that disease to recognise it when existing.

On the fifth or sixth day, one of the men (who had been up and about the day before) died suddenly, and without having exhibited the least symptom of yellow fever. I attributed his death to some organic functional derangement, most probably of the bowels, for neither purgatives nor *enemata* had any effect upon him.

The tenth day out we put into Hampton Roads, in distress, having for the preceeding two or three days made scarcely any progress, the ship leaking badly, and the engine almost entirely "broken down." At the very time of getting in, the only other death occurred—that of one of the firemen, who had been at his duty the day before. Could his have been a case of yellow fever? I think not.

We had not anchored when the boat from Norfolk to Baltimore came in hail, and with a single exception every passenger was transferred, bag and baggage, on board of her, and found themselves safe and sound in Baltimore next morning. I have either seen or heard from *every one of those passengers, and that one left on board since then, and not one of them has had the slightest symptoms of yellow fever.*

Now, when we bear in mind that the cabin of the Ben Franklin is below deck, and that it had constantly open communication with the hold, and that the delicate sea-sick women and forded; that the first case occurred at least one and a half miles from her, at a house on Scott's Creek, north-west of Portsmouth, in a patient for a long time bed-ridden, and having no communication with Gosport,—and soon after at Barry's row, to the north-east, and then at Gosport; these three positions, forming the angles of an equilateral triangle, the sides being one and a half miles in length, and all independent of each other.

But the *cause* of that terrible malady is not left in a moment's doubt,—with the presence of the meteorological ingredients mentioned,—the aggregation of filth and disturbance of soil now to be referred to, were amply sufficient to account for any amount of pestilence which prevailed, and although these were not exclusively confined to this year, yet there is no evidence that the meteoric elements were present to the same extent before, although there were cases of yellow fever. We are informed that a number of wharves were most culpably, (although economically), made years ago "*of green timber, logs and brush, which had now begun to decay, and were filled in with city filth, refuse, and low marshy debris, drawn up from the half-stagnant streams and pools in the neighborhood of both places, and with the shavings and refuse of the yard. That the hot sun and tides had alternate*

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children were shut up there most of the time, and that the male passengers were two days and nights constantly at the pumps—being, withal, of the class *fruges consumere nati*, and not "drawers of water," except for the nonce—is it not passing strange that none of us suffered from the pestilence with which, according to the newspapers, the vessel was reeking?

Moreover, the Ben Franklin had positively no cargo, *except coal and cannon*—none of which did she discharge. The "Breaking hulk," so much harped upon, could relate only to a few heavy articles of passengers' luggage, left on board, but which were stowed under an open hatchway.

My impression is, Mr. Editor, that the Ben Franklin is more sinned against than sinning. I believe she caught the infection at Gosport, instead of taking it there. Several men-of-war and other vessels had arrived in those waters a short time previously, all teeming with yellow fever. Why, then, make this most unfortunate of vessels, (you have heard and will hear more of her history,) the scape goat for the sins of others?

We have been reproached for leaving the vessel so unceremoniously the moment we got abreast of Old Point Comfort, and without waiting for the visits of medical or custom-house officers. To that I would say, even to rats is accorded the innocent privilege of quitting a sinking ship when they can. We had nothing to smuggle, and knew there was no yellow fever on board. This was the second time I had left a vessel under similar circumstances, and with equally little ceremony at Hampton Roads, and without ever hearing of quarantine or custom-house.

I desire this to be published, to vindicate myself, the officers of the ship and fellow-passengers, from the implied charge of a culpable recklessness, which, if merited, could not but—in view of its awful consequences—disturb the conscience of a fiend. I am anxious, too, that the medical faculty, in their noble labors and investigations as to the cause of the direful calamity, may have facts and data at command. J. T. PICKETT.

access to these putrifiable and offensive materials, and that this debris was farther used to fill up low places in the vicinity and suburbs; that so offensive were the wharves and yards in these infected localities where the fever first broke out and spread, and also near where the Ben. Franklin was moored, that a piece of meat exposed a short time within a few feet of the surface of the earth, became speedily putrid." Here, then, there is nothing wanting to complete the ingredients for the most fatal pestilence, and in conformity with those laws, with which I doubt if *there has ever yet been an exception, it came to fulfil the destiny man's folly and ignorance had prepared for it!*

Farther proofs of the correctness of our position, are, I am sure, not needed; yet the appositeness of the following will not permit me to forego them.

That there was great moisture in the atmosphere during the yellow fever of 1793 in Philadelphia, notwithstanding the great drought which prevailed, is shown by the universal complaint of the great oppressiveness of the heat. Laborers were often compelled to cease work when the mercury stood no higher than °84. It was observed, too, that the sweat on the surface of the body dried but slowly. It rained heavily on the 25th of August, and then not until the 15th of October. The stagnant air teemed with deadly vapors, scarcely a breeze ruffled the unbroken calm. "The light of the sun shone steadily and fiercely from the blue arch—hot and stifling like the dome of a furnace."

In New York, in 1795, the yellow fever was confined to the neighborhood of some unfinished docks, which were full of all manner of animal and vegetable corruption; across one of these, an obstruction had been erected, in consequence of which a pool of stagnant water was enclosed and suffered to putrify under a burning sun. There was much *made ground* in the same region derived from the offals from the streets and cellars of the city."

In 1798, the yellow fever prevailed in Boston, Wilmington, New York, Philadelphia, and the weather in each was characterised as "remarkably hot and moist," and with the presence of similar conditions as those expressed above.

It prevailed in Baltimore, in 1800, and was said to have been much aggravated by the "exposure of fresh earth to the action of the sun in the filling up of docks," &c.

Thus then, wherever records have been made, the meteorological conditions, I have deemed essential for this class of fevers, viz: much heat, fiery sun, humid atmosphere, much stagnant air, and when winds, usually from the East or N. East, together with great filth, crowded population, newly *made ground*, and disturbance of soil ever characterised the conditions—only varying according to circumstances and liabilities.

After all, it must, nevertheless, be acknowledged, notwithstanding all the sufferings temporally experienced, that epidemics are not entirely without their advantages; they, at once, exhibit the value and neglect by the authorities of sanitary ordinances, and point out, with an unerring eye, to those rotten ulcerous spots—those pest-houses in cities which are ever their seat, of almost whatever kind of disease prevailing, whenever a city is so invaded. Filth is man's great enemy—one of the chief objects of government, nay, one of the special ends of municipal institutions, where disease is so much more rife than in the rural districts, is the protection of the citizens by police regulations, and I cannot but think it is ever the *fault of municipal authorities, if a city is invaded by epidemic disease, and especially of the zymotic class.*

The value of sanitary ordinances has been widely experienced in almost every part of America, (may be excepting New Orleans, where they have only been applied to the most limited extent.) Baltimore, a few years ago, was unquestionably saved from cholera, then prevailing in neighboring cities and sections, when even the usual prodrome of the disease had made its advent, by extraordinary attention to her sanitary condition. In Boston it was once almost entirely prevented, and on another occasion was modified and ameliorated, and when it did occur, it was mostly in the neighborhood of her weak parts, the filthy and neglected spots, which were thus pointed out by it.

We shall see this summer the effect of the alarm and apprehension of a visit of yellow fever, in producing increased attention to sanitary police. Indeed I deem these occasional alarms greatly salutary, as conducive to the preservation of order and cleanliness, and therefore health. In New Orleans, the liberality and devotion to the *sick* is without a parallel *when the epidemic arives*, but very little is done to *prevent* its occurrence. In the paraphrase of a celebrated motto:—"millions may be given for *cure*, but not a cent for *prevention.*"

II. The second difficulty met with is in relation to some "*specific poison*," in order to develop yellow fever, "whose nature is said to be extremely indefinite, and whose origin is very obscure." It is admitted that of this germ or poison we absolutely know nothing—merely inferring its existence from its effects—or supposed effects.

No man doubts but that a specific effect may occur, without there being required any *one specific thing* to produce it always, and all medical experience is replete with instances to prove it. I need only mention one or two, thus: intermittent and bilious fevers—so much like yellow fever—may be produced by an almost infinite number of circumstances—a debauch—"taking cold"—a fall—an accident—a moral emotion, &c., &c.: the same with regard to the greater part of the extensive class of zymotic, and some other classes of disease—excepting, probably, the unequivocally contagious maladies. Why, then, should we look to some "specific poison," and to that alone, to produce yellow fever, and by men too who do not believe in its contagious properties? Now, all these diseases are recognized as the same, from whichever of the causes they originate. In the text as well as in the "supplement," it is shown that all these fevers may originate from the same cause, differing in degree—that is, combinations of the same elementary principles in different proportions—and in each be followed by a specific effect or result, differing from the other. The grounds of this opinion are therein detailed, and need not be repeated.

To this class of causes belong that supposed to be derived from animalculæ. The allegation of a specific, tangible material cause of a fever, requires something more than mere assertion, and this it has never had. At all times, and especially during the existence of malignant epidemics, the air is filled with microscopic animalculæ. The material world is everywhere and at all times teeming with life—each successive chain of being feeds upon his predecessor—some seek their sustenance upon man—and when their influence amounts to disease, it is, as far as *we know*, of a traumatic nature. The mystery of idiopathic fevers has never been even plausibly ascribed to them. Poisons, to affect the system, act in two ways—on the sentient extremities of the nerves, and by absorption. For the first there is required a special poisonous quality—this needs proof here, which is impossible—it is not even alleged. For the second, *previous solution* is indispensable, and this would change their qualities. The whole view of it is preposterous, and is contrary to the entire analogy of nature, and none but those entertaining a gross misconception of the character of insect transformations could, for a moment, entertain such an idea.

It requires a large amount of credulity to believe that the combination alleged to produce this disease, could produce the spontaneous birth of animalculæ possessed of such poisonous properties. In the elements to produce the "poison" (if you will), the true causa causans, there is no evidence whatever to show that these constituents are of an animal or cryptogamic nature, but every one to convince us that they are of no animated quality whatever, but producing their effect through an æriform nature, influencing the organism directly through the nervous system, and this is clearly the first and most affected in yellow fever.

Leibig has satisfactorily shown the impossibility of explaining, on chemical principles, the existence of even the lowest connecting parts of an organism of a cell or a muscular fibre; and Rokitansky has demonstrated the utter futility of the microscope as an instrument of diagnosis, between malignant and harmless growths and tumors. Is it saying too much, then, that he must be truly transcendental, who can see animalculæ the cause of disease so obscure as the idiopathic fevers.

It is alleged, besides the combination alluded to, or the agencies meant, there is a "secret agency"—a "peculiar something," productive of, or rather constituting the epidemic principle, which is the cause of its power and extension. There is no proof of this opinion, it is devoid of plausibility—it is at once an acknowledgment of our ignorance, and a poor excuse for the indolence which makes no exertion to ascertain it. These secret agencies and occult mysteries are the bane of the science, and are only a remnant of that feeling which gave rise to astrology, which clothes with suppositious virtues empirical medicine, and bolsters up all the isms and pathies of the day They must give way to experimental medicine and philosophical induction. If the profession would put their shoulders seriously to the wheel, instead of speculating in their closets, these ridiculous mysteries would soon give way to facts; endless disputes and false facts would no longer be a by-word and reproach, and the world would cease to laugh at our interminable differences, and the "uncertainty of physic."

No apology is needed in giving my own views of what I believe to be the true theory of the *causa causans* of yellow fever more *in extenso* than in the report itself, originally intended mostly for laymen, and I avail myself of the opportunity presented (by this edition) of giving more fully the grounds for the "faith that is within me."

How far, then, have we progressed in a strictly scientific understanding of the true etiology of yellow fever? What principles are fixed and stable upon the basis of scientific laws, during more than two centuries of its ravages? What a reflexion upon the profession, and why is it? We have had a vast amount of speculation as to its cause, but in America, at least, the experiments have been meagre and the facts few. In Norfolk even as recent as 1855, surrounded by government establishments, but the scantiest record of the weather was kept*—none worth the name, and at Augusta, for 1854, none could be procured. Too many are content with the beaten track—too many confine themselves to its pathology and treatment—too many are satisfied with limited views, confining their observations to a narrow circle, content with one series of circumstances not reaching a principle. I am too much afraid routine has been substituted for experiment, and that hypothetical assumption and defective observation have cast a cloud over the profession, and poisoned the great stream of truth even to its fountain head. Such is unfortunately too much the experience in all human investigations, dependant upon imperfect observation, until science, with her magic wand, is made to shed her vivifying rays upon them, it then progresses under the guidance of its laws, and the results are—final truth. I have by no means the vanity to suppose that I shall be able to dispel this cloud, but, at least, I shall give facts that do not admit of a doubt, and if I must necessarily speculate beyond merely generalising, it will be, I trust, upon their stable basis.

Let us then have something fixed, something established, and the sooner we begin the better. The true understanding of the etiology of yellow fever, which has become now the great bane of our country, is demanded of the profession, and implicates its deepest and most serious honor. Encouragement should be extended, instead of casting ridicule on every experiment, tending, however remotely, to develope the conditions or the laws influencing it.

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* To the first named place I sent the necessary instruments, with blanks and instructions but no results were procured.

There *must be a cause of yellow fever*, there *must be principles and laws governing it;* these are only to be obtained by observations and experiments assiduously made for a series of years and carefully recorded. Do we truly know the real *bona fide* cause of any one specific disease? Has ever the vaccine or small-pox virus been analysed? Do we know the proportions of their elementary constituents? Yet they must be formed of a *combination of elements in definite proportions, whose union forms them alone*, and these are the most special of all tangible causes; they are not only tangible but visible, the others are not, and yet no one has ever recomposed them from their elementary constituents. Except, then, the unequivocally contagious maladies thus formed, I know of no diseases that are more comparatively simple in their causation, except those requiring no coefficient. The folly then of ascribing yellow fever to any such cause as has been ascribed to these is obvious enough, the attempt so to limit it has puzzled physicians for ages. In all the discussions upon this subject a certain high range of atmospheric temperature was heretofore admitted as essential, that is now denied.* There is, however, a general admission by the profession everywhere of the necessity of a high temperature, moisture, and organic decomposition, and by many a special poison. My own impression is, that to the three first high solar radiation is to be superadded, that these all combined in some *definite proportions* constitute the agent (or "poison," if you will,) that developes that type of fever, yellow fever. The analogies illustrating this position are innumerable.

Combination is necessary to produce all the forms of matter; almost every substance we meet with on earth is but a temporary compound of ultimate atoms, to be hereafter resolved into its original elements—these again to be re combined with other forms and according to other laws—scarcely anything exists in its elementary condition, in any department of nature without it; and all the forms of organic matter, and everything that is of a character denominated *specific* is combined in proportions that are *definite.* No other proportions can constitute them; not only is this so, but a condition, or third ingredient, is usually required for this union, to give it this specific quality: thus oxygen and nitrogen may be mixed together in the definite proportions to constitute atmospheric air; oxygen and hydrogen in the atomic proportions to form water; yet these last results will not take place, unless pressure or electricity, or some other means be used to effect it. Chlorine and hydrogen, when mixed together in combining proportions, will not unite chemically in the dark; by exposing them to sunshine for a short time, they immediately combine with a violent explosion. Chlorine, when exposed alone to sunshine, seems to absorb the actinic principle, and now when mixed with hydrogen, unites with it in the dark.

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* *Vide ut antea*—records of the Academy of Medicine, New York, p. 55.

The combinations to which I refer are believed to be the result of the putrefactive process—a class of chemical actions, different in form and manifestation from ordinary decomposition;* and this may be one of the principal reasons why yellow fever is mostly confined to cities. These actions are dependent for precise results upon *identical* conditions; where these vary in the slightest degree in the quantity of heat, light, moisture, and more or less of oxygen, &c,, &c., the products ever differ. But these are nature's mysteries. Chemistry is replete with similar illustrations, and Leibig has extensively demonstrated them through his valuable labors. The analogy in the varying conditions resulting in combinations to produce disease, is palpable enough, and these precise agencies will, one day, probably, be pointed out, in the one case as in the other. It is precisely thus, most likely, why filth, heat, moisture, &c., may sometimes co-exist, and the disease not always be developed. According to these views, the true cause of yellow fever—the *causa causans—must be* some combination of the elementary forms of matter in definite proportions, and that these really form the "contingent condition," the "occult mystery," which has caused so much puzzle and speculation. This is that combination of terrene and atmospherical causes mentioned in the text, and, no doubt, a similar union constitutes the perennial origin of the whole zymotic class, each requiring and having their definite proportions. The grounds for this origin from the same constituents is set forth in the supplement, pages 274–5, &c., to which reference is invited. If we make a distinction between a poison and what Dr. Simon (in his distinguished report to the Board of Health of London) calls "rather the test and touchstone of poison," it will be readily comprehended what I mean by the *tertium quid*—the means—the essential—the "*combination*" for effect. This is what is so often called the "ferment," the "spark to set the materials on fire," &c. The "test and touchstone" is filth and impurities and aberrations of hygienic observances. When the atmosphere is in a fitting state, with this ripeness in the terrene, we require no farther "poison."

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* Leibig describes "putrefaction to be the process of fermentation in organic substances containing nitrogen and sulphur, which give rise to the formation of products of a disagreeable odor."

The forms of matter to constitute the specific diseases—small-pox, measles, scarlatina, syphilis, &c., *must be* a combination of materials, which do not often meet in unison to form these elementary diseases, or we should much more frequently see them break out spontaneously, and we call *them* "accidental," because we are ignorant of the proportions requisite to produce them; but then, surely, no one now believes that all the "germs" of these diseases which at present exist on the globe, buried, as they are, in the obscurity of the past, are or were derived from the primitive nativity or first combination, and that like the human species, they are all derived from an original unity! We from time to time, hear of their spontaneous occurrence under circumstances which render it *impossible* that such a succession should have taken place; or that the nativity could have been otherwise than spontaneous—and this only means the meeting of the elements in the definite proportions required to form the combination. These diseases first occurred in warm climates, and of course certain meteorological ingredients were necessary to produce them; they occurred under circumstances, and mainly with a population almost utterly regardless of all hygienic observances, and, of course, filth, in its widest acceptation, an essential ingredient, was not wanting, and the combination was due to circumstances which may be forever hidden from human observation, as much as the object to subserve, may ever be concealed from human intelligence.

It is now admitted by the principal advocate* for contagions, miasms and germs, and foreign importation in yellow fever, that the typhus and typhoid fevers, measles, whooping-cough, and even small-pox itself, may be generated spontaneously (that is, without foreign importation). and that sporadic cases of yellow fever may be of similar origin also. When it is admitted by all sound practical men that there is no real difference between sporadic and endemic, or epidemic fevers, but in the more or less *extent of the causes and conditions* under which they appear, this is virtually giving up the whole ground. A disease admitted to be of *spontaneous origin*, is *necessarily indigenous*—it is of local and domestic birth—although allowed to be *susceptible of importation with the atmosphere which generated it.* Its contagious, or apparently contagious properties, depends upon its mode of propagation, if this requires an incidental or contingent condition, if it is only propagated under circumstances similar to that which gave it birth, then it cannot be considered a contagious disease under the signification of the term ascribed to it by medical men. But, if it produces the identical disease *under all circumstances* and *wherever transported*, *like the small-pox*, independent of any coefficient, it is admitted to be contagious. Tried by this test, the advocates of the contagion of yellow fever have signally failed, and the cases copied from one publication to another, as illustrative of their views, have been disproved over and over again.

It will not do to say that here has been a case of yellow fever, and there another, and that the conditions pointed out *in general experiments* have not existed. These cannot be expected to apply to each house, room, yard, or individual, but only to *such conditions as would influence or be a fair exponent of the climate of the place.* Our position and reasoning upon it, applies solely to the disease in its general or epidemic form, as so often expressed, and any single cases, or less than an epidemic, must be applicable solely upon the conditions accompanying them.

With this explanation all the cases so ostentatiously paraded before the public, occurring under other conditions than those announced as required under the epidemic law, fail of their application.

This eclectic view of the subject is corroborated by all we know of causation. It is not merely a mixture which is meant, but truly *combination*, and of course in definite proportions, in obedience to the great law which has been so beautifully denominated "the marriage of the elements," and which consists of a union of their respective elements in *definite proportions* (as of those diseases specified above). Now, there can be no reason why the causes productive of yellow fever should form an exception to this *evident law*, nor any of the malignant diseases to which man is subject. Let us pause and reflect for a moment how beneficent this is in our great Benefactor, who permits evils to inflict our race, but has ever left it in our power to resist their action or arrest their development, by the appropriate exercise of that intelligence with which he has endowed his creatures. Of the various links necessary to form that chain, or to constitute that combination, remove or destroy one and the effects cease, or do not appear. Here, then, the kindness of Providence places all communities on the same level, and puts under the control of man's intelligence, everywhere, his own interests and his own destiny. Any other view of the subject leaves us without hope, an "occult" and "mysterious agency," "a germ" of which we know nothing, is a barrier to all efforts at improvement, and leaves us to the accursed fatalism of the bigoted Turk—somewhat analogous to that in which our own beloved city has been left so long, and here the example is so striking, as not to need furthe rillustration.

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* Vide Charleston Journal for Nov., 1856

Now all this is clear and reasonable enough and cannot be got over. The same thing, as evidently occurs in the whole class of zymotic disease, at least, if not in others. It is probable enough that specific diseases have special causes, that is, certain combinations which may occur, often or rare, dependant probably upon the number of elements necessary in the combination.

The variation of diseases in different climates, as plague in the East, yellow fever in the West, and the peculiar fevers of the coast of Africa and at Chagres, depend upon the same circumstanes as give varieties to plants, trees, animals; these are the peculiarities which characterise different climates, and consist more or less of heat, moisture, electricity, solar radiation, &c. To the solar beams in their different and constantly varying qualities and powers, as exhibited by an analysis of the solar spectrum, it is evident we must ascribe the greatest agency in the production of diversities of climate, and its influence in the production of disease must not be overlooked. The constitution of the atmosphere being every where pretty much the same, consisting of moisture, mean temperature, &c., the special qualities of vegetation, the germination, growth, color, and every quality they possess, nay their very vitality, are due particularly to the different rays of the solar spectrum.

The beautiful exemplification furnished by the vivifying sun-beam will serve a double purpose while I refer to it, not only in illustration of the subject before us, but of farther explanation of the influence of solar radiation on yellow fever. It is now well known that the solar ray is formed by a combination of three principles, viz: heat, light, and actinism, each endued with separate and independent properties to accomplish important purposes in the great laboratory of nature. Through it is developed the actions of all animated beings, nay the inorganic world is influenced by its chemical and molecular disturbing power. One decks with resplendent and variegated color the beautiful foliage of the forest and garden, and even mantles the cheek of beauty with the fine glow of bountiful life; while another preserves animation even during an arctic winter, causes the wind to arise, waters to flow, and gives to tropical regions their gorgeous and boundless fertility; while the actinic or chemical principle not only bids the seed awake and quicken in the plant, but acts on inanimate as well as animate bodies. Thus, on experiment it has been found, on an analysis of the solar spectrum, when a thermometer in the blue ray indicates 56°. in the yellow it will exhibit 62°, and a little beyond the red, 79°. That these principles vary among themselves in activity and power, according to latitude,—season, and even during the day is unquestionable. Thus during the existence of yellow fever, the red rays may be elevated to an abnormal degree so as to produce that remarkable *burning sensation*, the peculiarity of a yellow fever atmosphere, and from the rapid developement of the chemical principle at these periods, it is probable that the actinic rays or actinism, are much increased. Daguerreotypists, on inquiry, inform me, that the sun's rays are more active at these periods, but do not make so permanent an impression. In the climate of England the quickness of production is a hundred times more favorable to the photographic art than in the brightest region of the tropics. In Mexico and Yucatan the failure in this art has almost been complete, except during periods when the sun's rays were more or less obscured. Light and actinism being regarded as antagonistic powers. This is in accordance with what has been said in the text (at pages 90—91, &c.) in relation to the comparative amount of solar radiation at the north and the south: that it *increases* with the latitude (certainly in some of these principles) is now shown in their analysis. I have taken the solar temperature in the mountains of Tennessee, about latitude 36° in July, and found it at midday 145°, while the temperature in the shade was scarcely °70! and that here its elevation during yellow fever evinces an abnormal condition far exceeding that due to the latitude, I have no doubt, and the record shows it. Another illustration is found in the farther penetration of the sun's rays (that is, the red or heat producing) into the earth at the north than at the south,—thus, while at the tropics the line of *invariable temperature* scarcely exceeds a foot—about 40° N. latitude it is 30 or 40 feet, or more.

These several principles in the sunbeam are constantly changing their relative powers and capacities, not only as successive seasons demand their special influences over the vegetable world, but for their daily growth, color, and maturation; the juices of all vegetable products derive their highest flavor from the rays of the sun—plants and fruits will not fully ripen without them. Indeed, each day these three principles are shed upon creation in varying proportions. There is clearly an abnormal as well as normal condition of them, and there is no reason why they should not affect the health of man as well as vegetation. Whether this influence be through some electrical agency, as supposed, or some other less equivocal, the explanation furnished through an analysis of the solar spectrum is sufficient for our purpose. Even the inorganic world is not independent of their influences; the granite rock which presents its uplifted head in firmness to the driving storm—the stones which genius has framed into forms of architectural beauty—or the metal which is intended to commemorate the great acts of man, and which, in the human form, proclaims the hero's deeds and the artist's talent, are all alike destructively acted on during the hours of sunshine.* So powerful an agency in the vegetable, and even the inorganic kingdom, cannot be without its influence upon our *well-being* too. Through the different qualities of the sun's rays is acquired the great life-giving property to the earth, and through it are the differences and changes of climate. Has it these prodigious powers, and its modifications do not still modify the *health of man?* Let us then not hesitate to prosecute our investigations into this interesting and fruitful field of scientific inquiry—richly will it repay the persevering student by practical results.

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* Chambers

But there are many diseases which do not require this combined cause to have their influence on the system, meteorological agents alone being needed for the purpose, and it is of incalculable service to the practice of physic and humanity to be able to ascertain the *certain cause of any disease.* Among these is very properly mentioned by Professor S. B. Hunt what has been denominated *coup de soleil.** This I have demonstrated to be independent even of direct solar influence, and to be the result of high temperature (shade) and high saturation.

To this I am very much disposed to add cholera infantum. It is known to be most prevalent soon after the first advent of high temperature in summer. It occurs in cities mostly, and in their closely built parts with abundance of hot stagnant air, and it is almost at once relieved by cool weather, and particularly country air.†

To these may be added pleurisy, catarrh, pneumonia, rheumatism, &c., &c., as requiring no other special cause, or co-efficient, than meteorological conditions; and to these we can surely often add intermittent fever. And as experience becomes enlarged, and more attention directed to the cultivation of meteorology, and its connection with disease, more developments will be made. The area is broad, rich and inviting, and replete with important and lasting consequences to our race.

In a science like medicine —dependent upon observations, we want facts, well-ascertained facts; we want enlightened experiments and observations of all the phenomena, attendant on the fatal form of disease, under discussion (as well as all others), which has hurried to an untimely grave hundreds of thousands of our countrymen, and blasted the reputation and growing prosperity of some of the finest portions of our country. With a corps of competent observers, a uniform occurrence of facts will constitute laws, and medicine will then stand upon the same impregnable basis as chemistry and astronomy. The present defective condition of the science (in relation to this disease), arises from the imperfection of observation and records, rather than from the intrinsic obscurity or difficulty of the subject itself. Why should we not have formulæ and reasons in physic, as in what is called the exact sciences? If there are more elements required to ascertain results, the greater skill and ingenuity is called for to combine and eviscerate the truth from them. It is extraordinary that a profession which enumerates among its cultivators some of the most profound and acute minds of the age, and who readily take the highest position when joining any of the sister branches of science, should in the cultivation of this field, find obstacles which are not found in them. There must be some defect in the fountain-head whence flows this difficulty; medical education must be defective, where it does not satisfy or give proper direction to the inquiring mind, or embrace in its teachings all the branches of the science; this yearning after the higher elements of knowledge requires training, discipline and direction, or it will be groping, like the blind Cyclops around his cave. It belongs to teachers to form that early bias of mind—to give that direction and discipline, while after-cultivation prepares it for that elevated intellectual period, now so rapidly approaching. I believe I can say without fear of contradiction, that in relation to etiology, the basis of *preventive medicine*, it is hardly taught in the schools of this country at all. Now, this is infinitely more important to the community than curative medicine; preventible diseases being proportioned to non preventible, about as 8 or 10 to 1.

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* Vide address to State Medical Society.

† The immense and disproportioned mortality during infantile life which occurs in summer in cities, and particularly if the season shall have been unduly warm, must have struck every observor. It is, no doubt, aggravated by defective and improper nourishment, and particularly by bad milk and constitutional weakness, but the cause is as stated above, and results from their delicate organizations and their great susceptibility to changes of temperature.

The foundation of etiology must be derived from a proper study and understanding of climate, with the conditions influencing it—temperature, humidity, light, electricity, &c., as all these have their effect on the health of man. These are not limited in their influence to morbid action. Not only agriculture, the first and most important pursuit of man, is entirely dependant upon them, but a very large portion of the comforts and even the moral and mental standing of nations are materially influenced by them. Not only national habits, peculiarities, and pursuits derive their direction from climatic conditions, but the temperaments and thence the intellectual developments of an entire people are much modified by them. Throughout the whole economy of nature a certain amount of specific heat, moisture, solar radiation, &c., are needed in her operations. Should it then be deemed extraordinary that aberrations from these very natural and indispensible requirements should produce disease, and that the forms of morbid action should vary according to climatic conditions, as everything else does? It would be the operation of a constant miracle were it otherwise. Is it of no consequence then that these should be thoroughly understood, and that the agencies influencing them should be extensively investigated?—nay, the high value which a proper estimate of it furnishes should take it from the irregularity and uncertainty of private enterprise and pursuit, and eminently entitles it to national consideration. This to most medical men, however, extraordinary as it may seem, is really an occult science; few pay the least attention to it, or, may be, deem it of any importance. In illustration of this I have in vivid recollection an interview with a highly intelligent friend and well-known medical author, some years ago, in which I was in vain endeavoring to explain to him Well's theory of dew; he could not be made to understand how it was that dew could be deposited in any other way than that of falling like rain. Now whether it was owing to my own dullness in imparting the proper explanation, or that of the entire inattention of my friend to this department of science, I cannot say—the failure was complete. I merely mention this to show how little the medical mind, even of the eminent of this country, has had its attention directed to this important branch of physical science. A somewhat similar instance is related of the most distinguished natural philosopher of the age (Prof. Agassiz), who could not be made to comprehend the product of two by two when both the twos were negative. But algebraic analysis and its mode of research, geometrical computation, would seem to form, paradoxical as it may seem, an essential part of that mental calculation in which he is distinguished above all men living. To me the paradox is not more palpable than in the instance I have referred to, forming, as meteorology does, *or should*, an important branch of our own studies and duties. And I do hope, if any advantage is to be derived from my labors, none can be greater than while casting in my humble mite, I may succeed in influencing the direction of the medical mind of the country to this important, but much neglected branch of physico-medical science. At present it is totally unprepared for the investigation and comprehension of deductions drawn from it, and unwilling to give it credit for data and principles, which it alone can explain. Hence it is we constantly see the most distinguished of the calling, as well as others, instead of making experiments, bring forward their personal recollections of what the meteorological condition was at any particular period, and in some cases, many years anterior, which no man who even keeps a record can himself burthen his memory with, without a constant reference to it, while others utterly ignore it as a basis on which to predicate important practical deductions. I repeat, then, that to understand etiology properly is to study with more care and attention meteorology, and thus the blessings of preventive medicine will be thoroughly applied by the profession to the amelioration of human calamity, and it will be then fully appreciated by the community. This is the true end of the philanthropy of the science.

He is truly a great bigot who is ashamed to confess that he has never erred, or rather that he is not wiser from having lived longer. Self-confidence, individuality, a willingness to be thought sometimes wrong, instead of living upon the reputation of being always right, *because stationary*, are most cheering evidences of progress wherever they are seen, and it would be gratifying could they be oftener exhibited in this department of the profession. The belief that there are no new truths to be evolved, no higher points to be attained, no more reforms in philosophy necessary to be made, is a living death to a scientific man, giving him a position intermediate between the great men of the past and the children of the present generation. The paralyzing belief that science is at its zenith has been, and always will be, an obstacle in the way of progress.

If the views and principles, advocated in this report, are worth any thing, it is mainly that their adoption tends to dispel some of the strange mysteries, which seem to hang as clouds over free investigation, into the important field they embrace. And I have great cause to be justly proud at the kind, cordial, and flattering reception my humble efforts have received from the liberal and enlightened portion of my own profession, and of those capable of appreciating labors in this department of knowledge, every where —not only from my own country, but from Europe. Nor am I without willing and able coadjutors here, and I mention, among others, with as much pride as pleasure the names of my friends, Drs. Axson, Kennedy and Lemonier, who have nobly sustained me in my arduous labors, under no common difficulties. And I am flattered with the hope that our afflicted city will, ere long, test their soundness in their practical application, and that the principles established, and the example displayed, will extend their influence to other communities. This is the reward I have constantly sought for, and the consciousness that I was advancing this important step, has guided many of the weary hours of labor, and has buoyed me up in the brightness of hope in many a dark and almost despairing moment. Yet the original motive, without anticipating the important results investigation has led to, was simply the sense of duty imposed by public authority, and the partiality of my colleagues.

New Orleans, *March*, 1856.

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PREFATORY REMARKS.

The following Report has been re-issued, by the partial advice of some friends, to supply a farther demand of the public here as well as abroad —the first edition, printed by the City Council, and intended for private distribution, being now exhausted. The opportunity is embraced to fortify the positions taken in the Report itself; to extend its illustrations; and to give farther explanations of portions of it which have not been so fully understood as they might have been. The most material portion of this is embraced in a paper read before the "Academy of Sciences," of this city, defending the opinions and farther expanding the principles contained in the report. This paper is subjoined as a supplement. Therein is explained the difference between common mud and "original soil;" and the pathological and etiological differences between yellow and bilious fevers is shown to arise in consequence of proceeding from causes diversified in amount and expending their influence on different organs. This is illustrated by numerous analogies which the practical part of the profession furnishes us in the administration of medicines in doses differing in quantity in proportion to the effect we expect to derive from them, and that these medicines do really affect different organs precisely in accordance with their difference in dose or quantity. As that was written rather as a reply to an attack on the opinions set forth, the following views were not called for, but both are to be deemed supplemental and explanatory of the original report, and are placed before the scientific public for the reasons above stated.

The opinion is expressed in the report, that so highly injurious to health is the disturbance of the "original soil" of the country, when *the meteorological condition required to give it activity* is present—that it was considered one of the most efficient causes of every epidemic which has devastated the South-Western parts of the United States, at least during more than half a century. Since the publication of that report, public attention having been called to it, extensive corroborations have been given to it; some of which I will now proceed to record.

NATCHEZ.—The fever of 1825 was satisfactorily ascribed "to the large deposits of fresh earth which were dug up and exposed to the sun, with which a wharf was made. The first cases of the fever occurred here. They were confined to the immediate neighborhood. By interdiction, and finally removal, it was put an end to."* July and August unusually hot and rainy.

"In 1837, streets were cut down to the extent of four or five feet, levelled, and the balance spread on the low lots in the neighborhood; soon after which, a most malignant fever broke out in the vicinity, and of a most fatal character. These remarks are equally applicable to various other points in the city, where recent openings had been made in the ground and fresh earth exposed to the action of the sun."†

Again: "in 1839 Natchez was visited by yellow fever, in an epidemic form, and as the Natchez and Jackson railroad had recently gone into operation, and much fresh earth exposed by the extensive excavations both in and near the city, the effects were clearly manifested by the prevalence of the disease along the line of the road, and the town of Washington, through which the road passed,‡ enjoying, heretofore, the reputation of remarkable salubrity. The summers of both these years hot and rainy.

IN BATON ROUGE, 1827.—"The epidemic yellow fever of this year appeared at a time when several streets were being opened, and earth disturbed and spread on the streets, and assigned as the cause of the fever at the time."§

IN DONALDSONVILLE in 1827, (I think,) "the epidemic yellow fever was ascribed to the erection and enlargement of a new levee, extensive digging of ditches, and spreading the materials on the streets."*

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* W. H. Pearce.

† Ibid.

‡ Ibid.

§ Dr. French, Senr., and Wm. Elam, Esq.

"AT TERRE AUX BEUF, great sickness and mortality produced at the period of the excavating for the Mexican Gulf railroad, during which there was extensive digging and exposure of swamp mud."†

AT WILMINGTON, DELAWARE, the great epedemic yellow fever which devastated that place in 1802, was ascribed "to the streets being cut down and levelled, and the materials spread on them, in cellars dug and filled with water—the weather being very stormy, torrents of rain falling—much fog and misty weather, and the *disease seemed communicable as far as the fog extended*, BUT NOT BEYOND IT !—disease aggravated by any addition to moisture in the atmosphere."‡

COLUMBIA, SOUTH CAROLINA.—"The digging of the canal near the town in 1819, is well known to have greatly increased the amount and severity of the fevers of this usually very healthy locality."§

SAVANNAH, GA., in 1817–'20.—The severe epidemic yellow fevers of these years are thus accounted for by Dr. Daniel :‖—"Heavy rains, alternated by a hot sun—soon after the commencement of this weather, the City Council turned their attention to *the levelling of the streets*, contrary to the express objections of several medical gentlemen. In this process the refuse and offals of our yards and kitchens, which, for years had been permitted to accummulate gradually in mounds (where they were comparatively innoxious,) were, with a prodigal hand, *distributed upon the streets* and subjected to the influence of heat and moisture of the summer season. In addition, earth *was deposited in the depressions of the streets and lanes*, for the purpose of levelling them, which, mingling with the falling rains, produced numerous muddy and offensive places."

Do., in 1854, Dr. John F. Posey writes me, "That the earliest cases occurred of the epedemic fever of this year, in the neighborhood where the streets, and a square in front of them, *had been filled up*, to a level above the lots, which are occupied by as many small wooden houses as could be crowded on them, and which, on the commencement of the epidemic, were occupied by an incredible number of people—that the small space or yard-room had been planked over, on account of the mire caused by the rain water from the houses and streets, and that the boards were rotting, that under the houses, which are all very low, there were large collections of trash, chips, &c., rotting, and kept wet by the frequent rains, producing a stench which added to the effluvia from the rooms, was very offensive. From thence the disease extended over the city." How much like various parts of our city in 1853–'4!

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* A. S. Phelps, Esq.

† Ibid.

‡ See account of this fever by Dr. John Vaughan.

§ Dr. N. W. Gibbes.

‖ In his work "on the Fevers of Savannah."

In Buffalo, N. Y., Professor Hamilton clearly traced "the production of cholera, in 1852, to the influence derived from upturning the earth, with a stagnant, and, of course, humid atmosphere."

Louisiana.—Dr. Halphin, in his minute and graphic account of the cholera in this city and adjoining parts of the State in 1832–'3, ascribes it, most especially, to the vast exposure of the original soil, from digging the canal of the bank (referred to in the report,) and gives instances, as occurring in the interior of the State, where a similar exposure on plantations, was accompanied with a frightful mortality, both among the slaves and white people.

This subject might very well be left here, not only from the amount, but from the numbers, variety, and respectability of the authorities, and could be greatly enlarged, not only from the experience of our own country, but from various foreign countries. Farther testimony is deemed superfluous. I wish it to be distinctly understood that I have never said or intended to convey the impression, that this alone would produce disease; that, acting in a manner equivalent to filth, it only constituted one of "the blades of the shears of fate;" that the other (the meteorological) was indispensible to combine with it, in order to produce the effect. No instance has yet been mentioned, where these two combined their influences, and the results, as alledged by us, did not ensue—*provided there were susceptible subjects exposed!*

When a principle is established, a key is found to the explanation of a vast variety of phenomena—it is both the pilot and chart, which leads us to and teaches us great truths. By adopting the principle, that it is only during a certain range of the dew-point, (which is a mere measure of the amount of moisture in the atmosphere,) that certain diseases occur, we understand how it is, that in most insalubrious climates and seasons, a fire in a room protects the inmates from the influence of undue moisture, by lowering the dew-point, as is often done in this country. In Sierra Leone the natives have a practice, during the sickly season, of keeping fires constantly burning in their huts at night, assigning for it, that "fires keep away the evil spirits." Captains Cook and Peyrouse preserved the health of their crews, in their long and perilous voyages, in the most sickly regions, by drying and ventilating by fires, between the decks of their vessels; and the only successful voyage to the interior of Africa ever recorded, doubtless owed the salubrity which accompanied it, to the same cause. Thus, too, the night air is more dangerous than the atmosphere of the day. In all these cases, heat expands, dilutes, and promotes the escape of deleterious gases, (when these are limited and confined,) lowers the dew-point, and enables the skin to deplete the surcharged system of noxious ingredients.

It is an error to suppose that only the amount of aqueous vapor emanating from the body is influenced by the state of the dew-point. *All secretions* proceeding externally from the system are so influenced—as is perfectly obvious to all, who attend to their condition, either in their own bodies, or those of their patients, particularly during the seasons when the causes are sufficiently aggravated to produce an epidemic. The effluvia from *all* (particularly from the sick) is most obvious, and which no ablutions will entirely remove, but temporarily. We shall show, presently, that the most noxious of all substances to the human body is its *own worn out materials.* A high dew-point, and a stagnant atmosphere prevent the elimination and evaporation from the body of these offensive excretions, and in proportion as these are retained, the body becomes *protanto* to its own poisoner, besides being influenced by all the conditions without. The most careless observer during malignant epidemics, cannot overlook these clearly demonstrative conditions. They are recorded in the following pages, in every exhibit of the daily atmosphere and mortuary condition. A high temperature, a high dew-point, stagnant atmosphere, close rooms, and a patient reeking with offensive perspiration, will carry conviction to any mind, not closed against it by prejudice, or insusceptible from incompetency. So offensive are these odors often during the existence of yellow fever, that many physicians are induced to believe that they are *diagnostic* of the disease external.

In relation to the influences ab externa, a very striking instance occurred to me during the epidemic of 1854, which I will relate. Being called some distance up the river, while it was raging in the city, on returning, I had to take a steamboat containing much live stock, (hogs, sheep, cows, &c.) The boat was, from this cause, offensive beyond conception, and I remarked to my companion, a professional gentleman, that there would, probably, ensue considerable mortality from it, after we reached New Orleans. In the course of a few hours, a considerable change in the weather, rather suddenly, occurred ; a fall of temperature ensued, (and, of course, the dew-point,) and all the offensive odors at once subsided. Nor could they be perceived in any part of the boat. Having accidentally omitted to bring my hygrometer with me, in vain, sought a thermometer to take the dew-point. In a couple of hours we reached the city, and I immediately proceeded to take the dew-point, and found it about 60 degrees. From this period the epidemic retired. It is to be remembered, that this is about the degree that the report states that the epidemic usually retires.*

As to the philosophy of it, or the mode of action of a high dew-point, retaining the effete matters in the system, we are not at all at a loss. It is evidently a *law of being*, in the constant changes which are ever occurring in all organized matter, which designates it as different from the inorganic, *viz.:* that materials once used, are no longer fit for the purposes of life *of that being ;* it must, then, pass on through the circle of created things, before it can become again adapted to the necessities of that individual ; and it is now an excretion. It has performed the part allotted to it. It is the effect of a high dew-point and imperfect decarbonization of the blood, by a subtraction of at least one-fifth of the amount at a temperature of 80 degrees, from what there is at 60 degrees, besides what influences the system, through the cutaneous envelope, to cause the retention of these now noxious materials. Whether this is done as the result of excessive action, as stated in the text, it is necessarily accompanied with diminished power and tonicity, speedily resulting from the condition, and the consequent elimination does not take place. As a result of this state of things, the surface is kept hotter with sweat, evaporation does not take place; there is an offensive atmosphere surrouding the individual; there is great torpor of the capalaries, and the system is laboring under a load of effete and poisonous materials. Such is constantly the case in that atmosphere surcharged with an amount of impurity sufficient to give origin to epidemic fevers. In the chronic diseases of hot insalubrious climates this influence is displayed in a very striking manner in the "bombicinous" aspect—the pumpkin colored appearance of the skin of the natives and long residents, in their enlarged spleens and diseased livers —the chronic intestinal affections and general torpor of the body (and too often of mind;) and a very striking proof of the correctness of the principle and its explanation, is derived from the success of the mode of remedying it. Health is known to be best sustained in these climates by acting on this very surface; by a free use of the bath and coarse friction, by cleanliness, a regular life, and early morning exercise, when there is known to be more ozone in the atmosphere.

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* Vide table in the Introduction.

That a large amount of moisture is essential to the production of fever, and *that none occurs without it*, whatever may be the temperature, has been so fully impressed in the report, that farther proof is deemed superfluous. As illustrations are, however, sometimes more striking to the mind than the most direct proof, I will furnish some. It is well known that the high temperature of sandy deserts, never produces *fever;* that the fiery blast of the Harmattan which desecates the fluids, and withers the whole aspect of nature, *puts an immediate end to fever*, and that on the coast of Africa, after the rainy seasons, they welcome this blast, as with it the recovery of invalids commences. It is clear that the presence of undue moisture was the prevailing obstacle. There are some valleys wherein the foot of man has never trod and, returned from alive, and which are whitened with the bones of the victims of temerity. These are the true types of the "valley of the shadow of death." Several of these are known to exist in tropical regions. They are evidently made so by the condition referred to. They are deep; ventilation cannot reach them; a stagnant and of course a damp air, forever hangs over them, and hence, their fatality to human life. The temperature of some deep valleys in Africa has been actually found as high as 118°. It is very probable that the dew point must have been about 90°—evidently incompatible with a lengthened continuance of existence.

It is well known that malignant fevers do not occur in elevated regions, even in the tropics, and Baron Humboldt places the limits at 2500 feet. The reasons assigned are not very clear or definite. It is easily accounted for on the grounds set forth—from the amount of humidity essential for the prevalence of such fevers, being absent. I found the *humidity* at Jalappa (in Mexico), whose elevation is a trifle less than that above stated, to be in early Nov., at *sunrise*,* .606 } Saturation being 1000
and at *midday*, .566 }

At the City of Mexico, whose elevation is about 7500 ft. above the level of the sea, I found the *humidity* in November and December, to be at *sunrise* .685 }
and at *midday* .378 } do.

It has been asserted by very respectable authority that "the mean dew-point of the *summer* in the United States is 1·5° above that of *autumn*." What part of the "United States," is not stated. In *this* part of the United States the difference is less than 2°, on an average of near 10 years, and that difference is derived solely from comprehending in it our very dryest month, *viz.:* October. But if we compare the dew-points of the two months of June and July with those of August and September, the difference is only about one-tenth of a degree. It is, however, a *general fact* that the highest dew point occurs in the sickliest month, which is almost always August in this country. The same occurs at Rio Janiero, and it is believed wherever the yellow fever occurs as an epidemic, and records have been made of it.

We shall see in the report that the rule in relation to the amount of temperature, necessary for the existence of yellow fever in Philadelphia, is at a lower rate than what exists in this climate—the same rule doubtless applies to the dew-point. There are peculiar climatic conditions applicable to every country, to constitute the seasons of each normal or abnormal; what is normal to one would not be normal to another in different latitude and condition, and the consequences resulting to each of these must be judged of *mainly* by its own standard, although the principles are the same. But where the climates, latitudes and conditions are similar, the same general rule should be the standard of comparison. Thus, in relation to Savannah, the only place from which I have been able to procure the records in detail to apply the principle to, (and it is for the disastrous year 1854), it will be seen that by the annexed table, and by comparing it with that in the "Introduction," in which the meteorological elements deemed essential to the existence of epidemic yellow fever here are stated, that not only a very great similarity, but almost identity exists between them, thus verifying the principle referred to.

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* Am. Jour. Med. Sciences, 1846, p. 107.

I have used every exertion to procure the requisite records, from other places for the purpose of a more extensive comparison, so as farther to verify or refute the opinions expressed, but hitherto, unsuccessfully.

The Meteorological Elements Prevailing at Savannah, Ga.,

At each of the several epochs of Commencement, Acmè, and Declination of Epidemic Yellow Fever there, during the autumn of 1854.

1854.	TEMPERATURE. General average at			TEMPERATURE IN SUN. Average at			DEW-POINT. Average at			BAROMETER. Average at			WINDS. Pre dominate at			HUMIDITY. Average at			DRYING POWER. Average at		
SAVANNAH, GA.	Commencement.	Acmè.	Decline.	Commencement.	Acmè.	Decline.	Commencement.	Acmè.	Decline.	Commencement.	Acmè.	Decline.	Commencement.	Acmè.	Decline.	Commencement.	Acmè.	Decline.	Commencement.	Acmè.	Decline.
August 17—20, *Beginning*,	79.44			No record taken—but said to be very high.			71.78			30.169			S. S. W.			.810			7.79		
Sept. 10—14, Maxim. or *acme*,		84.14						79.44			30.282			S. S. E. S. W.			.790			4.70	
October 27—31. *Declination*,			69.60						64.91			30,123			S. E. N. N W.			.855			3.08

During the worst month, September, 7,457 inches rain fell.

During the worst month, September, 790 was the mean humidity.

The *greatest storm* that ever visited the city since its settlement, occurred in the evening of the 7th, and accompanied with heavy rains, ending on the morning of the 9th, immediately after which, the fever went up to its maximum—during which, there was much thunder and lightning.

Hurricanes are said to put an end to yellow fever in the West Indies, "as frost does in America"—or rather a depression of the dew-point to a certain degree. Here it seems the very reverse took place, and that the acmè or maximum intensity of the disease immediately followed. It will be seen, hereafter, that stormy weather has a very injurious influence on those affected with yellow fever.

(For the statements from which this table has been compiled, I am indebted, through a friend, to Dr. Jno. F. Posey, of Savannah, to both of whom I return my sincere thanks.)

In bringing these observations to a close, it may be instructive to make a resumé, to see what opinions and principles are entitled to be deemed established or sustained, and to offer them to the fair and candid investigation of my professional brethren, to whose examination they are presented, with the hope thât they will apply the same *personal tests and trials* that I have bestowed upon them, before they give their final judgment of their value. Our science is a progressive one ; its great principles are only to be reached through the rugged paths of *experiment and observation ;* speculation is but another name for guessing and conjecture. Its path is paved with false facts, enlightened only by the occasional glare which genius and ingenuity cast upon it, and will only tend, as it has ever tended, to throw doubts and cast clouds over a subject of the dearest interest to the welfare of our kind. Let us discourage these, and the great truths of the science will be vouchsafed to us in time, if not now.

1st. That the epidemic yellow fever has never occurred here (at its commencement) but during a high dew-point (the minimum being upwards of 74°). In Savannah last year it was almost 2° less, and continued for some time.

2d. That it has always ceased, as an epidemic, before it descended as low as 58 °. In Savannah last year, it terminated when it was a fraction less than 65 °. In 1848, here, it ceased at about 1 ° higher, although the average of a series of years was, when it reached 62 ° 12'.

3d. That at temperatures of the dew-point below these, sporadic or endemic yellow fever may occur, but it is not known to have existed here, with any certainty, as an epidemic, when the dew-point differed from that above stated.

4th. That what is miscalled the CONTAGION OF YELLOW FEVER, or its liability to spread, exists *only with the first condition.*

This, at once, strikes at the root of all contagion in yellow fever, *per se.* No one pretends that *sporadic* or *endemic* yellow fever is contagious ! *Do these differ from epidemic yellow fever in their natures ?* No one has the hardihood to make any such pretension. A change of air which suddenly lowers the dew-point to near 58 degrees, (here) if continued, puts an end to epidemic yellow fever ; a crowded population may enter the city, occupy the houses, rooms, nay, the very beds, which lately reeked with yellow fever, yet not an instance, which can be attributed to contagion occurs. The filth, the miasm, and all the "terrene" matters, are just as before. *But one change has occurred*, the connecting link, the combination, has been broken—the *meteorological element* is *wanting*, and the *effects* are no longer present. Can anything be more conclusive? Where is the contagion now? Does a few degrees of temperature less, at once, disarm the giant that has been mowing down, but a day or two before, his countless victims with his remorseless scythe? The "contingency" exists no longer. Such a misnomer is applied to no other disease. "Sober second thoughts," and sound judgment, worthy to enlighten and guide this people, will not apply it here when its unsoundness is thus exposed.

5th. That the main controling influence in all unhealthy situations is MOISTURE, whether in cities, towns, countries, ships, or dwellings, although filth and heat are to be deemed correlative.

6th. That MALARIA is not any one specific thing, but that all impurities of the air, and organic matter in decomposition, are liable to influence injuriously, the organism, and particularly the worn out excreta of human beings may be so denominated, and is particularly incompatible with healthy action, and when in combination with the meteorological condition, may produce yellow fever.

These, if future researches shall confirm our observations, are all deemed of inestimable importance to society—and the more so, if they shall be found to apply to other climates and conditions.

The views, principles, and opinions, embodied in this report, I am proud to say, and have the honor to acknowledge, have received the approbation, sanction, and endorsement, of many of the most distinguished scientific inquirers of our country, and some of these testimonials are, by permission, placed in the antecedent pages of the work.

REPORT

OF THE

SANITARY COMMISSION

TO

HIS HONOR J. L. LEWIS,

MAYOR OF THE CITY OF NEW ORLEANS;

AND THE

HONORABLE THE MEMBERS OF THE BOARDS OF ALDERMEN AND ASSISTANT ALDERMEN.

Gentlemen:

You will be pleased to accept herewith a Report embodying the results of the labors of the Sanitary Commission, upon the special and various matters committed to their charge by the Council. The delay in presenting it, is ascribable almost entirely to the comprehensiveness and thoroughness aimed at, in gathering from all sources of sanitary intelligence, here and elsewhere, the facts and phenomena deemed useful in tracing and attesting the origin and causes—the atmospheric and terrene conditions—the transmission—duration and expulsion of that formidable disease—the yellow fever. No opportunity has been slighted—no toils have been spared to push our explorings and researches throughout the vast realms of the yellow fever zone, in both South and North America, and the West Indies, and the voluminous sanitary data prefixed to our Report, are our vouchers for the magnitude and extent of our labors. Even since our Report has gone to press—most valuable accessions, in response to our circulars, have been received from abroad; and we are still farther assured of valuable testimony on the way to us from distant fever regions worthy of all consideration and respect.

Out of these data, together with the experience of many years, have grown the materials which form the opinions and principles put forth in the Report, as to the origin and causes of yellow fever, of which no more may be said at present, than that two of these principles will be found of inestimable value after experiment and experience shall have fully tested their soundness and infallibility.

The one is that yellow fever is and always has been, here and elsewhere a *preventable disease*, and

The other is, that the presence of two general hygienic conditions are absolutely indispensible to the origination and transmission of the disease—the one of them, atmospheric—the other terrene. These must meet *in combination*, or there will be no result. The absence of *one*, as to *this* disease, is as the absence of *both*, and as one of these conditions is almost wholly within the control of man and the other partially so, it must follow that his power extends to its prevention and expulsion.

These two principles constitute the bases of all the preventive and remedial measures with which the Report closes, and which were specially devised for practical execution through the minstrations of the city authorities.

Throughout the several Reports we have cónstantly endeavored to avoid speculative opinions—to adapt all our principles and suggestions to practical ends, having the great object of our appointment—utility to our stricken city—ever before our eyes—as a polar star for our guidance.

With the presentation of this Report, the authority of the commission ceases. Its labors and its functions end together, yet its members cannot part with the voluminous record of their toils, without an expression of their entire and unwavering confidence, that, if the preventive and remedial measures they have recommended, shall be fully carried out, rigidly enforced and perseveringly maintained by the city authorities—it would be altogether impossible, for the yellow fever to originate here, or to be disseminated as an epidemic, if brought from abroad.

THE
JOINT AND SEVERAL FUNCTIONS
OF THE
SANITARY COMMISSION

During our late great epidemic, the subject of the sanitary condition of our city became a theme of deep concern and anxious scrutiny. The great malignity of the fever—its unparalleled spread, visiting places heretofore exempt from its ravages, all tended to arouse public attention, and the conclusion was at an early period arrived at, that the subject merited the most thorough and careful investigation.. Prior to this period the sanitary condition of the city had not received the attention its great importance required. We have had occasional Boards of Health, whose existence continued two or three years, with large intervals intervening, and being mere boards of record with little authority or means, but partial benefits resulted from them. Divers opinions had been expressed in the city journals with regard to the salubrity of the city. The public had been pretty steadily assured, by the authorities and others, that "the city was one of the healthiest in the Union, although subject to occasional epidemics." Confiding in these assurances, the great mass of the citizens took little part in the subject, being quieted and lulled into security by these representations. Our reputation abroad, however, from occasional exposures by Boards of Health and other sources, and above all, the great calamity of 1853, fully aroused the public, and induced the determination to look thoroughly into the subject, and through the urgent promptings of public sentiment, the Board of Health, (the only body then acting that had the power —the City Council having adjourned for the summer,) appointed the Hon. A. D. Crossman, Mayor of the city; Drs. E. H. Barton, A. F. Axson,

S. D. McNeil, J. C. Simonds, J. L. Riddell, to constitute a Sanitary Commission.

To this Commission were deputed special instructions for inquiry and investigation, viz:

1st.—To inquire into the origin and mode of transmission or propagation of the late epidemic yellow fever.

2d.—To inquire into the subject of sewerage and common drains, their adaptability to the situation of our city, and their influence on health.

3d.—To inquire into the subject of quarantine, its uses and applicability here, and its influence in protecting the city from epidemic and contagious maladies, and

4th.—To make a thorough examination into the sanitary condition of the city, into all causes influencing it, in present and previous years and to suggest the requisite sanitary measures to remove or prevent them and into the causes of yellow fever in ports and other localities having intercourse with New Orleans.

The Commission immediately organized and proceeded with due diligence to the fulfillment of the important task confided to it. It issued circulars embracing all the points suggested for examination, and distributed them among the medical faculty and citizens here and the adjoining States, and to every quarter of the yellow fever region, whence information could be expected to enlighten its judgment on the subjects to be considered. It sat as a Court of Inquiry in this city daily for about three months, eliciting and inviting information from every accessible source.

When this field had been sufficiently explored, it deputed its various members to visit different parts of this and the adjoining States where the epidemic had existed, to institute inquiries upon like matters and report upon them. One member was sent to visit the various Eastern cities, to obtain information of their sanitary condition, ordinances and usages. He was likewise instructed to visit Washington, to apply to the Government of the United States for aid in obtaining through our Diplomatic and Consular agencies throughout the yellow fever zone, whatever information our circulars called for, or that would advance the cause we were engaged in.

The readiness and courtesy shown by the Government of the United

States, the efficient aid and co-operation of the medical profession, and others here and elsewhere, the intelligence and readiness manifested by those gentlemen to whom our circulars were addressed, are sources of gratification to the members of the Commission, and it is our desire to state emphatically, that although much diversity of opinion existed, not only in the profession, but among others, whose evidence we have procured, from nearly every part of the yellow fever zone, as at present existing—we have conceived it our duty to receive and promulge them, and let the public judge of the propriety of the deductions drawn from them. The ample success which has followed our efforts to procure information is attested in the evidence and documents accompanying this. The reports on the subjects presented to our consideration, must speak for themselves, they are all herewith presented to the Mayor, City Council and the public, and we tender our kindest acknowledgments to the Secretary of State, (Mr. Marcy,) for the facilities he has furnished us in acquiring most valuable information from abroad from the highest and most valuable sources; and

To Mr. R. G. Scott, U. S. Consul, and Drs. Pennell, Lallement and Candido, at Rio Janeiro; Mr. W. Lilley, U. S. Consul, at Pernambuco; Mr. J. Graham, U. S. Consul, and Dr. H. W. Kennedy, at Buenos Ayres; Dr. W. Jamieson, at Guayaquil; Mr. S. Grinalds and Dr. Lacomb, at Puerto Cabello; Mr. N. Towner, U. S. Consul, and Dr. J. W. Sinckler, at Barbadoes; Drs. Amic and Chapuis, at Martinique; Mr. J. Helm, U. S. Consul, and Dr. Pretto, at St. Thomas; Dr. W. Humboldt, at Mexico; Mr. J. W. Dirgan, U. S. Consul, and Dr. Lafon, at Matamoras; and Mr. Pickett, U. S. Consul at Vera Cruz; and J. W. Dana, U. S. Consul at Lucre, Bolivia.

The duty of investigating the various subjects referred to this commission under the instructions has been duly distributed among the different members—to Drs. Axson and McNeil, the first; to Dr. Riddell, the second; to Dr. Simonds, the third; and to Dr. Barton, the fourth.

INTRODUCTION.

The Sanitary Commission, in fulfillment of the important trust confided to it, has deemed it one of its most urgent duties thoroughly to examine into the past state of the health of the city, so far as records could be procured to attest it. These have extended beyond half a century—although the records of many of the years have been sparse and imperfect. With occasional exceptions the results have proved very unfavorable to its health in the past; yet, as sanitary guides and beacons, they are regarded as full of promise for the future.

There must exist some cause for the great insalubrity shown in the mortuary returns. It certainly does not arise from its *cleanliness* and the absence of those sources productive of disease in every country. Then it must derive its origin from those conditions in which it differs from other places that are healthy. It must proceed from those circumstances which the uniform experience of mankind has found to be the cause of insalubrity elsewhere. Or shall we abandon as useless, all the dear bought experience of our race, and remain as we are despite our recent severe and bitter afflictions? Are we forever to turn our face upon the past, and to be made no wiser by its valuable teachings? The problem thus presented to us to solve is not a new one; it has been solved a thousand times before; we give it again, with the special experience derived from our locality and circumstances, and with the same uniform results.

The value of general hygienic regulations has been extensively commented upon in a subsequent report; that of personal hygiene is hardly less important; upon this depends mainly not only our personal comfort, but health; and it is in many cases the only substiute for sanitary regulations of a more general nature, affecting the entire community; and is of special value to us here where the latter have been so much neglected. That they are more appreciated than formerly, is shown by the remarkable fact that about half a century ago leprosy existed to such an extent in New Orleans, that it was deemed necessary to erect a hospital for its special treatment, (a quantity of land in the rear of the city having been appropriated for the purpose,) and there are still surviving among us those who have a lively recollection of that loathsome malady. It too, has yielded to the ameliorating hand of civilization and modern comfort, or climatic changes, and is now confined to the inferior grades of society in Cuba and Mexico. When the general principles of hygiene shall have been as widely extended over the city, our epidemic and endemic fevers will in like manner disappear, and we may again enjoy that salubrity which was once our wont.

The *causes* of this insalubrity have been most carefully scrutinized, and it is our deliberate conviction that they are fairly ascribable to local conditions which are mainly removable. A reference to some of them here, the principles applicable to them, and the recommendation for their removal or abatement, will not be inapplicable in anticipation of the Reports themselves.

Throughout the vast period to which this investigation has extended, commencing when the population did not exceed 8,756, (in 1796,) *no epidemic* has occurred that has not been preceded and accompanied by a great disturbance of the original soil of the country, (in digging and clearing out canals, basins, &c.,) although other local causes doubtless had their influence. This has been so unequivocal and so constant, and *without exception*, that it seems to the Commission to bear the relation of cause and effect. The proofs of it are furnished in the following pages, and might have been greatly extended in its more local influences. This disturbance seems to have generally taken place with great recklessness, manifestly preferring for the purpose the warm season, during which it is most dangerous.

We have to make the same remark in relation to the clearing and draining the neighboring swamps, both of vast public utility, and when done in a suitable season and proper manner, under enlightened advisement, not injurious to the public health; but most disastrous, when these are not faithfully observed, as medical annals for hundreds of years past fully attest.

The numerous undrained, unfilled lots and squares dotting the surface of the city, becoming muddy pools in the rainy, which is always the sickly season, and common receptacles for filth and garbage of all kinds, are exhibited in our *sanitary map*, and should be early abated.

The numerous low, crowded and filthy tenements, many of which are also indicated on the map, are probably as disastrous in the production of yellow fever as any other; they are common "fever nests," and are denominated "nuisances" of the deepest dye. They constitute the ordinary hotbeds of disease and death at every *epidemic period*, (yellow fever, cholera or what-not.) They have been signalized by a most fearful mortality. They conduce much to impair the reputation of the city for salubrity and they demand therefore the firm cauterizing appliances of the city government.

The extensive livery stables in the heart of the city, and vacheries near the thickly populated districts, and the vicinage of slaughter houses should be abated, as they strongly tend to impair the purity of the city atmosphere.

The present cemeteries within the city limits should by all means be closed against future use.

The kitchen offal and back yard filth, including the bad system and neglect of the privies, constitute some of the greatest sources of vitiated air, and require the most active agency and timely surveillance of the Health Department.

The system of sewerage set forth in the second report is confidently recommended as well for its economy as its promised efficacy.

The present mode of cleansing the streets is most defective; the time is inappropriate. It should be done, at least during hot weather, when the sun is no longer present to distil the poison into the atmosphere. The carts should in all cases *immediately* follow the scraper and remove the gathered garbage, in covered carts, and that taken from under the bridges should never be spread upon the streets. It had better be left where it is, protected from the sun.

None but the most superficial disturbance of the soil, or cleaning out of canals and basins, should be permitted during the hot season.

The bank of the river, the levee, wharves, and filth from the shipping, require a special police; they constitue some of the most pregnant sources of disease.

The effect of these various nuisances and others on the disastrous fever of last year, is fully set forth on the sanitary map with its accompanying exposition.

After the ample detail of local causes for our summer and fall fevers under a high temperature and the great humidity incidental to our position, it is scarcely necessary to say that we have a sufficiency of them, without looking abroad for the sources of our insalubrity. Nevertheless, in relation to the subject of QUARANTINE, although the Commission is unanimous in the belief that no system, however rigid or successfully carried out, can ever be a substitute for the sanitary or preventive measures we have recommended, and which if properly enforced, would be at once a protection against both the origination and spread of yellow fever and cholera among us, yet in the imperfection that must attach to all such measures, we unite in recommending the establishment of a quarantine station below the city, under the surveillance and control of the "Health Department," thereby preventing *all foul vessels* from entering the port with *diseased passengers or crew*, *placing the restriction only where it is a measure of safety*, and furnishing character and security abroad to our intercourse with other nations.

We are sensible there is great difference of opinion among the members of the profession and in the community in relation to the communicability of yellow fever, and have investigated the subject with great care in the following pages; and the conclusion we have come to, is that yellow fever is not a disease personally contagious, that its infectious properties are only communicable in a foul or infectious atmosphere; that is, that a foul vessel or individual with the disease, will only propagate it, under atmospherical and local conditions similar to that which furnished its nativity. That although vitiated or infectious air may be conveyed in goods and in various ways to distant places, ventilation speedily dissipates it, and that if disease results, when it is much concentrated, or with very susceptible individuals, it extends no farther, except under the conditions above specified. The occurrences of the last season, and we believe, all antecedent years, supply us with innumerable illustrations in the establishment and corroboration of these important principles.

But farther than this, the Commission has not remained satisfied with theoretical presumptive evidences. Most careful scrutiny into the actual occurrences of the first eruption of the fever, its spread, the character of its localizations. the persons most liable and suffering from whatever class and country, have converted presumptive proof* into positive certainty, that the fever originated with us, that its fatal malignity and spread was justly attributable to a very remarkable concurrence and combination of atmospheric and terrene causes, always peculiarly fatal to human health and life. These have been most amply examined and fully pointed out, and the gratifying fact is shown, that at least one of these causes is entirely under our control, and that it is in our power greatly to diminish the other, and hence by *disseverance*, the fatal union is prevented.

The Commission has taken great pains to investigate the climatic condition, to which our latitude and position peculiarly expose us, so far back as meteorological records would permit. It is impossible to overlook the fact that the meteorology of a place, is, in other words, its *climate*, and upon this mainly depends the character of its diseases, for these special liabilities are dependant upon conditions which constitute the difference between one climate and another. Were it otherwise all climates would have similar diseases, nor would varieties of season alter them. We have become impressed with the conviction, that much error has existed on the subject, and that the evils incident to our location can be greatly ameliorated. It may be probably premature at this early day of the practical application of meteorology to etiology, to venture into much very precise detail, with regard to the elements essential to the existence of the two great scourges of our city, (yellow fever and cholera.) But in the infancy of meteorological inquiry, as at all beginnings, there must be a starting point. The testimony we offer to the scientific public, is submitted with great diffidence, but as pioneers, we make our humble offering at the shrine of science, to be corroborated or refuted by subsequent observations. If true, we cannot over value their importance, if not, the experiments to disprove them will lead to valuable results.

We have essayed to show what are the precise meteorological or climatic elements, necessary for the existence not only of epidemic yellow fever, but of cholera; that is, to show what are the meteorological conditions under which they prevail, at each stage of their commencement, progress, maximum intensity and declination. The difference in the combination productive of yellow fever and cholera may be comparatively small, although the effects are so different, nor is this very uncommon or wanting in illustration in various departments of science or medicine. A change of wind, with a difference of five or ten degrees of temperature may produce the most fatal pleurisy, pneumonia or laryngitis. So, the same apparent condition produces a great diversity of effects on individuals of different physical susceptibilities, and a difference of one or two grains of moisture in a cubic foot of the air we breathe may, and often does result in the occurrence of the most fatal maladies.

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* The undersigned members of the Sanitary Commission, dissent from this assertion, denying the positive certainty alledged.

J. L. RIDDELL,
J. C. SIMONDS.

The results we have come to, after a careful analysis of the records in this climate, at least, during the several years through which these are reliable, (and they have been made with great minuteness during the last twenty-one years, and corroborated as far as they go by those of every epidemic yellow fever and cholera that has existed in this country, of which there are any records; the more special details embracing nine epidemics of yellow fever and six of cholera,) are embraced in the following table.

CLIMATIC OR METEOROLOGICAL ELEMENTS OF EPIDEMIC CHOLERA AND YELLOW FEVER AT NEW ORLEANS;

AND COMPARISON OF THE METEOROLOGICAL CONDITIONS WHICH HAVE PREVAILED, DURING THE THREE EPOCHS OF COMMENCEMENT, ACME OR MAXIMUM, AND DECLINATION, OF THE EPIDEMICS OF CHOLERA AND YELLOW FEVER,

ON AN AVERAGE OF SIX OF THE FIRST, AND FIFTEEN OF THE SECOND.*

	No. of epid's examined	Average duration of epidemic influence, in days.	Average Ratio of mortality for each epidemic, to the population, per 1000.	TEMPERATURES IN THE SHADE.			TEMPERATURES IN THE SUN.			TEMPERATURES of the Dew Point.			BAROMETER;			WINDS.			HUMIDITY.			DRYING POWER.		
				GENERAL AVER. AT			GENERAL AVER. AT			GENERAL AVER. AT			GENERAL AVER. AT			Predom nt at			General avr. at			General avr. at		
				Commencement.	Maximum.	Declination.	Commencement.	Maximum.	Declination.	Commencement.	Maximum.	Declination.	Commencement.	Maximum.	Declination.	Com'ne'ment	Maximum.	Declination.	Commencement.	Maximum.	Declination.	Commencement.	Maximum.	Declination.
From Cholera,	6	37. 66/100	21.99	72.84	66.95	69.73	81.36	84.59	80.31	66.71	56.79	61.14	30.109	30.060	30.075	S E &E	N.E E&c	N& SW	.850	.796	.791	5.06	7.08	7.24
From Yellow Fever,	15	58. 33/100	18.30	80.14	79.60	65.72	106.91	117.07	99.11	75.82	74.34	62.12	30.108	30.024	30.074	N. NE SE	E.& NE.	NE N& E.	.888	.865	.755	3.79	4.53	8.02
Difference	..	......	.....	7.30 more.	12.65 more.	4.01 less.	25.55 more.	32.48 more.	18.80 more.	9.11 more.	17.55 more.	0.98 more.	.001 less.	.036 less.	.001 less.	m. NE	But l'tle dif.	m NE &E	.038 more	.069 more	.036 less	1.27 less	2.55 less	0.78 more

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* The investigation to reach the positions in the Table, have extended as far back as records have existed, reaching from 1817 to 1854, inclusive. During the earlier epidemics, the meteorological materials found have been very scanty, but constantly increasing as we approach the present period. During the nine yellow fever epidemics embracing most of the date in each of the columns of the Table, it is remarkable that, although the results stated are but an *average* of the whole, the *extremes*, or variations from it, in any year, are very small. For instance, that most important one, the *Dew Point*, the *minimum* at which the *epidemic* yellow fever passed off, has required, to destroy that character, has been noted at 58° 26; and the *maximum* in any year, under which it ceased its ravages, was 66° 64, being a difference of a fraction over 8° only; of course, the temperatures in each case was much higher, and the remarkable fact is shown that *no epidemic in that long series has required that the temperature during which it has ceased its ravages* should descend to the *limit of frost*, and that actually the minimum at which any *epidemic* ceased was a small fraction over 60°. This corresponds, so far as we know, with what we find of it in more Southern countries. This refers exclusively to its character as an *epidemic*. It has never been known to have ceased entirely at once. But the cases occurring after the disease has lost this character, must be considered as *endemic* or sporadic and to arise from strong local causes and great personal susceptibility. Time has not been allowed us to extend this investigation fully to a comparison with other places and climates, but it is in active progress and we hope to communicate the results hereafter.

This table shows what an examination of the details of which it is but the concentrated result would more than justify; viz:

1.—What are the several meteorological conditions of yellow fever and cholera at the *commencement*, *maximum intensity and declination* of these two diseases when existing in their *epidemic* grades.

2.—In comparison, it shows that cholera exists in a greater range of temperature and humidity than yellow fever.

3.—That these diversities constitute the pabulum for its support, so far as the mere climatic condition is concerned.

4.—That a higher solar radiation and atmospheric pressure exists during yellow fever periods than during cholera. Although the atmospheric pressure under which these two diseases prevail are shown by this average table to be about the same, the barometer continuing at a permanently higher grade, more regularly and constantly in yellow fever than in cholera, yet in this latter the fluctuations are much greater; indeed, it is so under all its climatic relations, as is abundantly shown in the large detailed table too extensive for this summary, of which this is a very condensed abstract.

5.—That for the existence of yellow fever a higher range of temperature and of dew point for its commencement and maximum intensity, and that a declension of the former (temp.) to less than 70°, and the latter (dew point) to near 60° puts a speedy end to its *epidemic* existence.

6.—That a larger quantity of rain usually falls, on an average, during the existence of yellow fever than during cholera.

7.—The "drying power" is more variable during cholera than during yellow fever.

8.—The average duration of *epidemic* yellow fever has been 58.33 days, and the period of its influence decreasing, while the average duration of *cholera* has been 37.66 days, and the period increasing.

These experiments are fully borne out by what we see daily verified of the ravages of these two very different diseases in the various climates that have been subject to them.

If subsequent observations shall prove the correctness of these statements, the future occurrence and continuance of *epidemic* yellow fever will be ascertained with great probability by referring to a well kept meteorological register; it will show what valuable information is to be derived from connecting accurate and extensive meteorological experiments with the Health Department, recommended in a subsequent report.

There are but two practical remarks which we deem it necessary to draw from this table, and from the reasoning in the reports: the first is, that although it is easier to keep free of yellow fever than of cholera, we can exercise much influence on the causation of both, even in their climatic relations; and secondly, the *combination* of the terrene and meteorological conditions which is *absolutely essential* to the existence of either, we *certainly* have it in our power greatly to control, because, by proper policeing and regard to other hygienic measures, that condition is clearly under our influence.

If then, we have demonstrated, as we trust we have, in the subsequent pages, these important truths, and shown what are the meteorological elements necessary for the existence of EPIDEMIC yellow fever, and even of cholera, and pointed out the conditions in which they decline, its great value will be appreciated, not only by the scientific public, but far beyond this, its importance for the practical purposes of life will be inestimable. The ability to make the announcement that an epidemic exists; and again, that it suspends its ravages, and that all danger is over; in the first case warning the accessible population to speed to a place of safety, and in the second enabling us to invite back the flying citizens to their deserted homes; to open the public thoroughfares to the resumption of business, and the ordinary purposes and pursuits of life, will be of incalculable practical value to the community. This principle is held forth for our guidance throughout our report; nay, it is the basis on which is founded, the object sought—PREVENTION, saving the community from the *infliction of disease.*

We state these as the result of our experience *in this climate*, and let us be understood to mean that by the meteorological elements of these diseases, (consisting of a very high range of temperature and saturation, and great solar radiation,) we intend to express the limits within which they have prevailed here *epidemically*, which are essential to their existence as such, and beyond which they soon cease. Now, whether these views will be borne out elsewhere, we believe there is, as yet, no recorded (certainly no published) statements to show. We are perfectly sensible that climatic conditions and national susceptibilities differ in different countries, and produce often diversified results, and that cholera has prevailed in great apparent diversity of climates, and that the meteorological elements would seem not to apply to it. Statements are recorded of the prevalence of cholera when the EXPOSED thermometer was near zero—this is not at all incompatible with an *inside* temperature of between 70° and 80°, with filth, the peculiarly noxious effect of crowding and most defective ventilation, (and of course, a high dew point,) all of which, we know, exists in Russian dwellings, where this disease prevailed. The incongruity then no longer exists, for it is *the condition to which the individual is exposed that is to be estimated.* Nevertheless, we acknowledge that it will take time, observation and experiment in different climates to show where and what may be the variations, if any, from the views laid down. There is little doubt, however, that if they are not precisely the same elementary or atomic (if we can use the expression) combination, yet the *principle* is the same; to-wit:—a union of meteorological and terrene conditions for the production of either of these epidemics.

The principles set forth in the reports, the facts commented on, the important and necessary combination of meteorological and terrene conditions, the places and sources of infection pointed out in our map, with their constant consequences, have been most impressively and accurately illustrated and corroborated by what has occurred during the present summer, (1854.) Fever has again been *manufactured in* the depots pointed out, (under the combination alledged) the filthy wharves and river banks have again cast their noisome odor to poison the atmosphere, and the additional aid from corrupted bilge water and filthy vessels from abroad, the dirty back yards and unfilled lots and overflowing privies have added their mite, the cleansing out of canals and the disturbance of the streets for laying down water and gas pipes have continued throughout the season, and although the streets have been better attended to than heretofore, they form a very small portion of the necessary policeing of a great city, and the result has been that yellow fever has again swept off its numerous victims and will ever do so until we become wiser by the lessons that have been so often furnished us.

But again, this position has been farther confirmed by what has occurred in other cities during the present year. In the city of *Savannah*, the epidemic of this year is with great probability attributable to the exhumation of a large number of vessels sunk just below the city during the revolutionary war and that of 1812, to the filthy land and other debris derived from the city and the tide, which was thrown upon the bank near the town and even spread upon the streets, over which the wind constantly blew, and to the excavation of the soil of the streets (at least a mile) for the purpose of laying down water pipes.

The epidemic at *Augusta*, was as fairly owing to the cleaning out of filthy canals in the city, and exposure of the offensive mud to the hot summers sun, to the emptying the city filth on the bank of the river, which was unusually low, and to the disturbance of the soil of the city for the purpose of laying down gas pipes.

Since the special reports were written, and even gone to press, some, indeed most of the foreign reports, highly valuable as they all are, have been received through the State Department at Washington, and it is no slight gratification for the Commission to compare their experience and observations in relation to the etiology and contagiousness of yellow fever with their distinguished confreres in other regions of this zone, and to see the remarkable harmony in our views; it furnishes a strong corroboration of the opinions and principles announced, and presents a new claim on public confidence.

For the purpose of carrying out in a full manner the views herein set forth, we earnestly recommend the project of a Health Department in a subjoined report. Such an organization we deem indispensable to the condition and character of the city; special requisites are demanded, with experience, science and skill. It should be constituted a special Consultative Department, to be advised with in all cases by the city government, affecting the health of the city, and it will be seen, hereafter, they are very numerous. No enlightened large city is without one, and here it is more demanded than in any other.

It is recommended to State, city and corporate authorities, that whenever disease of an *epidemic* character exists to an unusual extent or malignancy, that special commissions be instituted to investigate their origin and causes. Such action is in consonance with the philosophic spirit of the age, and we are proud that the first Commission for this great philanthropic purpose, should have the honor of having been originated in New Orleans.

ERRATA.

Page 2, read Condition for Commission, in heading

" 3, read [illegible] for effluvia, in line 11th.

" 4, 14 lines from top for "passee" read *passu.*

" 5 6 lines from top—on margin, for "postulata" read *probata.*

" 5, 13 lines from bottom for "reasonably" read *seasonably.*

" 6, 17 lines from bottom for "members" read *numbers.*

" 12, 6 lines from top—insert *not* between "I" and "think."

" 23, in 4th line from bottom for "thermometer" read *barometer.*

" 25, 11 lines from top—attach note after 50.3* "on the 23d after epidemic had declined, and at the very period marked for its declination, evidently producing it."

" 25, 17th line from bottom, for hygrometic read "hygrometric."

91, 5 lines from bottom for "productions" read *production.*

106, in note at bottom for "same" read *I am.*

" 107, 18 lines from bottom after "offensive" insert "and the cutting down the bank of the river, and spreading the materials on the streets."

Page 109, 9 lines from top for "causing" read *producing.*

" 182, 16 lines from bottom for "lethal" read *lethalè.*

" 200, 19 lines from bottom for "nature" read *influence.*

" 200, 2 lines from bottom for "fellow" read *fever.*

" 207, 15 lines from top for "renewal" read *removal.*

" 211, 12 lines from top after "amount," insert *of moisture.*

" 221, 4 lines from bottom for "secured" read *sewered*

" 228, line at top for "gradual" read *gradually.*

" 239, in 8th line from top for "monaxysmal" read *monoxysmal.*

" 241, in 7th line from top after "fifty" insert of.

" 241, omit two lines beginning at "16th," 13th line from bottom.

" 247, in 2d line from top for "men" read *even*

" 247, 14 lines from bottom for "200,000" read 2,000,000

" 248, in 11th line from top for "on the" read *as a.*

" 249, in 9th line from top after "burthens" insert *respectively*

For table "H," read table G.

ADDITION TO ERRATA.

Page 79, first line, top—for "*succession*" read accession.

169, 11 lines from top—"*distinguish*" read distinguishes.

205, 15th line from top—put a period after moisture, and a capital "P" to "*probably*," next word.

220, 14 lines from bottom—for "*ills*" insert benefits.

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The following table was prepared for the purpose of aiding to fill up the three first columns in the table in the Introduction, so as to extend the averages over as large a number of epidemics as possible, with no intention whatever of publishing it. It is furnished now at the unanimous request of the Sanitary Commission, as embracing important views of our comparative condition but little known, and upon which most erroneous opinions are entertained.

The climatology of the year has also been most carefully compared with that of the preceding epidemic years and found entirely to correspond. It has also been comprehended with the averages in the other columns, and adds its important mite in their verification.

This table farther shows, that with the exception of the remarkable year 1853, produced by the most unusual concurrence of causes—that it is *certainly* in our power to say shall never occur again—that the yellow fever *is not increasing* among us; that the present year stands in comparison with others but as the tenth, and still does not forbid us to entertertain the sanguine hope, expressed elsewhere, that if the suggestions as to its prevention are fully carried out, we may be enabled to drive it entirely from among us.

Since the "Report on the sanitary condition of New Orleans" was put to press, important corroboration of its views in relation to the causes of our epidemics has been obtained—besides those mentioned in our "Introduction," in relation to this year. If necessary, they can be comprehended in a supplemental report—wherein, with other documents intended for our report, but necessarily excluded—I propose to state the meteorological elements of epidemic yellow fever in other climates and places, in corroboration and illustration of what has been found here.

E. H. B.

COMPARATIVE TABLE.

Estimate of the Salubrity of New Orleans, as affected by her Epidemics.

1st—of Yellow Fever.

YEAR.	Total mortality.	Mortality from yellow fever.	Total population, (actual and calculated.)	Milesemal.	Milesemal.	Relative mortality of each epidemic.
				Ratio of total deaths to total population.	Ratio of total of yellow fever to total population.	
1817	1,772	600	24,196	73.22	24.79	3d.
1819	2,138	425	26,183	81.65	16.23	9th.
1820	1,766	400	27,176	64.98	14.71	11th.
1822	2,734	808	31,706	86.86	25.48	2d.
1829	2,520	900	47,561	52.98	18.92	6th.
1832	8,099	400	55,084	147.02	7.26	14th.
1833	4,976	1,000	57,713	86.21	17.70	7th.
1837	4,807	1,300	68,229	70.45	19.05	5th.
1839	3,934	800	73,487	53.53	10.88	12th.
1841	4,549*	1,325	78,745	57.16	16.82	8th.
1847	9,043	2,318	108,609	83.11	21.34	4th.
1848	8,026	872	115,503	69.48	7.54	13th.
1849	9,862	769	122,511	80.49	6.27	15th.
1853	15,787	8,101	154,132	102.42	52.55	1st.
1854	10,564†	2,484	160,823	65.69	15.44	10th.
Totals,	80,577	21,624	....	......	......	....
Averages,	5,371	1,441.60‡	76,777	73.30	18.30	....

The same as affected, 2dly, by Epidemic Cholera.

		From Cholera				
1832	8,099	4,340	55,084	141.02	78.78	1st.
1833	4,976	1,000	57,713	86.21	17.32	3d.
1848–'9 (of '48)	8,026	924	115,503	69.48	7.99	4th.
1849	9,862	2,081	122,511	8.049	16.98	2d.
1852	8,670	1,080	147,441	58.80	7.32	5th.
1853	15,787	554	154,132	102.42	3.59	6th.
Totals,	55,420	9,979	....	......	......	....
Averages,	9,236	1,666.16‖	....	89.73	21.99	....

To complete this table to the present period, and render it more satisfactory, it was necessary to *estimate* many of the past months, as well as some *future returns* for 1854; for, there being no authorized Board of Health, or of record, to enforce returns from the cemeteries, several have reported in the early part of the year irregularly, and sometimes omitted it altogether. I have been able to procure a reliable return for January; for parts only of February, March, April, and May, and have had to estimate the balance; for the rest of the year to the 18th of November, the *returns* are about the same as usual. That in relation to yellow fever is, no doubt, as reliable as at other times. The balance of the year has been estimated.

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* Including Lafayette hereafter. † Partly estimated ‡ The mortality from *yellow fever* in *epidemic* years, thus forms 26.84 per cent. of the whole mortality. ‖ The mortality from cholera in *epidemic* years, thus forms 18.03 per cent. of the whole mortality.

REPORT

UPON THE

SANITARY CONDITION

OF

NEW ORLEANS,

BY

EDWARD H. BARTON, A. M., M. D.

SECTION I.

SYNOPSIS OF ITS CONTENTS.

Preliminary remarks—General programme of grounds assumed and positions to be proved:—The Science of Hygiene—Ignorance of the Truth and assumptions of Facts, leading sources of error, as to our past and existing condition—Filth and Disease—Their relations to one another—The effects of imputed perennial insalubrity upon the thrift and growth of a city—What the healthy and natural standard of mortality of the Rural Districts of a country is—What the like standard in the Urban Districts. Sites of cities never selected wholly on account of salubrity—Sanitary measures and their results in this country and elsewhere—The sine qua non of their efficacy everywhere, must be skill in devising them—seasonableness in applying them, and promptitude and perseverance in enforcing them, &c. &c.

The Sanitary Commission at an early day after its organization, deemed it advisable to assign to each of the members, severally, one of the prominent topics, into which the subject (with which it was charged specially by the city authorities) naturally and conveniently divided itself. To my share was Division of duties.

allotted the special and arduous duty, of making "A THOROUGH EXAMINATION INTO THE SANITARY CONDITION OF NEW ORLEANS, AND OF ALL AGENTS AND CAUSES INFLUENCING IT DURING THE PRESENT AND PREVIOUS YEARS, AND TO SUGGEST WHATEVER IN OUR WISDOM WILL TEND TO IMPROVE AND PRESERVE THE HEALTH OF THIS METROPOLIS." This opens a vast field of research, with corresponding responsibility, and on a theatre where the making and preservation of records are the last things to be thought of; however, those archives, the fruit of the garnering and toils of years here, will now show their value, as well as foresight, in collecting them, and it only remains to set forth for public consideration and judgment—the facts—reasonings and conclusions, which have resulted from our investigations; and which I proceed now to do.

REPORT.

Importance of the subject.

That this particular and voluminous branch of the subject, as well as those branches of it, devolving upon my learned associates, is full of importance to our immediate constituency, and eventually may become so to the age we live in, we confidingly believe, because we are fully hopeful of the results which must follow the adoption of the preventives and remedials we have suggested, at the close of our labors. But, will the city authorities, adopt and carry out, such as we have suggested and advised? That is more than we can say: But, this we *know*: That if the causes we have assigned for the late devastating pestilence, as well as those which have preceded it in past years, be clearly and inevitably deducible from the facts we have presented, and are truly assigned;—then must it follow as does night the day, that the preventives and remedials we have recommended, if seasonably applied and rigidly enforced,—will not only forestall and *prevent yellow fever* from *originating* here, but from *propagating* here, should it be brought from abroad.

Causes of fever assignable

Let me be understood. I do not pretend to say that *all* the causes, to which we assign the production of yellow fever, can be forestalled in their coming, or expelled when they do come, by any human agency, whatever; for, the meteorological condi-

Not atmospheric alone.

Not filth alone

tions of elevated temperature, excessive saturation, great solar radiation, large precepitation and prevalence of particular winds, or the absence of all winds, may not be entirely preventable or remediable, by the art or the power of man. But, (as will be seen, throughout the report,) great as is the influence we attribute to the presence of these most deleterious and alarming agencies, we have no where attributed, nor wish to attribute, to these agencies *alone*, a capacity for originating or propagating that disease. It is only when they are in *combination* with those morbific influences, which we have denominated *terrene*, (which embrace every species of noxious affluvia, which filth of every description, and disturbances of the original soil, generates and transmits,) that the etiological conditions exist, for the production and spread of the pestilence. Moreover, it is a doctrine of the Report, as it is a corollary from the premises—that the terrene condition *alone*, is without the power to originate the disease, in the absence of the meteorological conditions referred to :—otherwise our goodly city would be apt to furnish the *pabulum* for the disease, not only for the summer and fall months, but expose us to the pestilence throughout the year!

These controlable.

Neither alone sufficient

Now, it is a further doctrine of the Report, that these *terrene* causes or conditions, are entirely, and always, within the reach and control of man, and remediable and removable, therefore, at mans' option and pleasure. The *terrene* causes then of great filth, &c., being removed and extinct, the meteorological would be powerless to *originate* the disease here, and if imported here, it would be quite as powerless for propagation, be the meteorological conditions even as ominous and menacing as they were during the late epidemic, and whatever might be their injurious influences upon diseases not needing, for their existence or duration, the presence or potency of the *terrene* conditions ; although, most assuredly, we think, that the meteorological conditions never have reached, and never can reach, any thing like the insalubrious and blighting excesses of the past year, in *the absence of the terrene conditions*, whatever may be the affiliation or sources of causation and dependance between them.

The remarkable culminating points of each.

Proof.

These remarks are most fully borne out by a brief reference (in advance of what will be more particularly detailed hereafter,) to circumstances attendant upon the largest mortality, the subsidence and cessation of the late epidemic. The subsidence was gradual, it was true. It always is so. But it was marked, and full of significance. Solar radiation reached its loftiest elevation on the 19th of August; the epidemic reached its culminating point on the 22d; down, but gradually, subsided the combination of high temperature and great humidity, and although the latter, was occasionally very high afterwards, the *combination* of high temperature was wanting to give it virulence; the epidemic, also, gradually declined, pari passee, with these important changes in the atmospheric element, which hung over our doomed city like a funeral pall, and as they gradually passed away, the refreshing blasts returned, until the health point (the equilibrium) was reached, and the epidemic had ceased, weeks before the great queller, (as is thought,) *frost*, made its appearance, and fully one month earlier than all prior epidemics. The chart B, and tables D, and E, accompanying this Report, are absolutely conclusive of all this.

Combination only, fatal.

Well, in all this time, and up to the final cessation and disappearance of the epidemic, what became of the *terrene* condition. *They remained wholly and absolutely unchanged!* Indeed, all knew (or *seemed* to know) that it would have been madness to have *disturbed* them, while the fever lasted, and of course, they were let alone, or not materially altered, (except the cleaning of the streets, which is a very small part of the cleaning of a city—probably not constituting a *twentieth* portion .) What better proof could one have than this of the total seperability of the two conditions? And what better proof could there be that as the separation progresses, the disease subsides, and that when the seperation was complete the disease was extinct! And what can follow—BUT THAT IF

THE COMBINATION HAD BEEN PREVENTED, SO WOULD HAVE BEEN THE DISEASE!

To sum up—the leading and controling principle that has guided us in all our sanitary conclusions is that the following *postulata* have reached the importance of demonstrated truths, through the facts and reasonings set forth in the Report, viz:

1st. That a close junction and combination of the meteorological and terrene conditions (referred to) is absolutely indispensable to the origination, transmission and duration of yellow fever every where.

2d. That all the terrene conditions referred to, are controlable and removable by human agency; and consequently, are seperable from the meteorological conditions, at man's option, and at man's pleasure.

Postulata.

3d. That the atmospherical element can be much modified and ameliorated by man's influence.

4th. That the irresistible corollary from the *probata* are, that yellow fever is an evil, remediable and extinguishable by human agency.

Corollary.

The great practical principle of the Report, therefore is, that the yellow fever, although among the greatest of physical evils, is demonstrably; a remediable evil, and it will be the function of a future section to set forth, in detail, the remediable appliances, which reasonably employed and scrupulously enforced, will, I feel confident, extirpate that disease in any locality.

Yellow fever preventable.

All this we maintain confidently and boldly, for our conclusions have been neither overstrained nor far-fetched, but are the legitimate progeny from the relations subsisting between cause and effect. If others may disallow or distrust them, most assuredly the Commission could not. How could we, when we know, that in the fullness and accuracy of the facts we have gathered, no toils have been spared; that in collating them one with another and assigning the appropriate weight to each, every care has been taken, with searching and impartial scrutinies for our guidance, to commit no mistake, and as to the facts and analogies we have brought from afar, we have presented the most

Duty, responsibility, and toil of the commission.

eminent and reliable medical authorities of the living and the dead, as our vouchers for the facts they have recorded and the deductions they warrant, when applied either to them or to our own special testimonies. It is these deductions which constitute and authorize the results we have proclaimed; and these results constitute the bases of the principles we have promulged and maintain in relation to the origin and causes of and the preventives and remedies for the extirpation and extinction of yellow fever.

Looking then, to the momentous interest we represent in this first great sanitary movement in the South—inviting the utmost scrutiny into our facts, principles, authorities, and the corollaries we have deduced—we only expect that confidence to which, we humbly deem, all are fairly entitled. If, upon such investigation, the recommendations are found reasonable; if they are in accordance with the science and the well attested experience of the present enlightened age; then we hope there will be no hesitation in putting them upon immediate trial. The "let-alone system" has been tried long enough; it has filled and darkened with a deeper gloom the domicils of the dead—cast adrift members of our cherished population—restrained and still restrains large and valuable accessions, and has checked and impaired our advancement and thrift in every branch of industry. The trial has been full and *unsatisfactory.* ALL unite in saying there must be *sanitary reform*; it is written in indelible characters on the age.

Fair examination and immediate trial.

Health is the greatest of earthly blessings; the rules applicable to it are reduced to a science; it is denominated *Hygiene*; it is governed by principles and regulated by laws, almost as precise and exact as those attached to any other department of science. It is the true science of life; it teaches men how to live, and how to prolong life, and when properly applied, it has increased its average duration for terms averaging from ten to twenty years, and surely, this is worth striving for. It is now fully understood, and the most enlightened communities and nations are adopting its principles, and applying them to prac-

Laws of health established a mark of civilization tice. In our country it has diffused its blessings in proportion to the extent of its application. The adoption of its principles, as well general as personal, is a mark of civilization, and characteristic of refinement. Indeed, sanitary reform is the talismanic *indicium* and distinguishing amelioration of modern reformation.

No ills without a remedy.

From the afflictive dispensation with which it has pleased an all-wise Providence to visit our city during the last summer and autumn, it becomes us to draw lessons as well of wariness as of humility. There are no physical ills inflicted upon man without their uses and their recompense. If the mortuary calamities of the year will drive our people (so long deluded on the subject of their sanitary condition) to open their eyes to the actual truth; if it can be demonstrated, to their satisfaction, that we have labored and suffered under *remediable ills;* that there is yet hope for us, then the fearful lesson we have been taught will not have been in vain, and we shall be able to date from 1853 a new era of prosperity and progress, in all that may be compassed through numbers and commerce—health and thrift.

Value of the lesson.

New Orleans requires sanitary reform, more than any other city.

In no part of the world is a thorough sanitary reform so much needed as in New Orleans. In no country on earth has a place been so much injured through a want of insight into her sanitary condition by her municipal officials. In none have more pains been taken to keep from the people a knowledge of it; the very attempt to enlighten the public in relation to this important interest has been steadily repulsed with denial, if not with incredulity, and the authors have been pointed to as inimical to the city! The obvious effect of all this has been the almost entire neglect of sanitary measures. There is another party who ascribe all the ills said to affect us to a *foreign* source; and again, there is another who despair of the power of man to alter our condition. This fixed incredulity as to the existence of facts on the one hand, and of the exotic sources of importation of the malady on the other, with an utter inadequacy of means of preventing its introduction, or expelling it when it came, is plainly

Risk in speaking the truth.

Causes of our neglect and apathy.

Ignorance of our condition.

Highest proof of patriotism.

the cause of our apathy at the results, and restraint upon all trials at amelioration. Either opinion is adverse to a change, and from the statu quo in which the city has been kept for so many years, it might be supposed these were the prevalent opinions. They may be all resolvable into an ignorance of our actual condition—of what has produced it, and of those vast influences that have effected the wonderful changes in the sanitary condition of cities all over the globe. A belief in them has heretofore been a barrier to all improvement, has palsied the hand of enterprise, and has driven from our city valuable citizens, and prevented the immigration of labor, of wealth, and of intellect. That these views are sincere there is no doubt; that they are erroneous I trust to *demonstrate* in the course of this investigation; that they are entirely un-American, so entirely opposed as they are to the progressive advancement of the age we live in—so outrageously at variance with what has been clearly demonstrated as the result of the application of sanitary laws and usages elsewhere, I think there is no doubt. I trust to show that they will not bear the touchstone of examination, and that it is the highest aim of patriotism to make an attempt to alter them.

Filth and disease, cause and effect.

New Orleans is one of the dirtiest, and with other conjoint causes, is consequently the sickliest city in the Union, and scarcely anything has been done to remedy it. That the one results from the other, is in exact accordance with the *common sense*, the *common experience* and *common feelings of mankind*, and yet, to use the language of a distinguished investigator, "the city lies quiet, with an open keg of powder with a lighted torch only a foot above it." Like causes produce like effects, under the same circumstances, forever. If then, the city is to be restored to salubrity, there must be a *radical change*. It is the duty of medical men, who, from their studies and province, ought to know the value of sanitary measures, to urge upon the community their great importance, to show the critical condition on which rests the foundation of public prosperity; and if any change is to be wrought, "it is best to be done quickly."

No city can bear many inflictions of such a calamity as that of last year without serious deterioration. Concealment and boasting will not help us much. Public confidence is plainly on the wane; the disparaging truth that almost every official as well as unofficial means have been used to conceal, deny, explain away, has been resorted to, and now it stands forth in all its unabashed effrontery, in the very face of well attested and repeated proofs afforded by our Board of Health and our Medical Faculty, that the evil exists, and is remediable.

Proof of our gullibility.

When, a couple of years ago, an enterprising fellow-citizen (James Robb, Esq.) informed the public that "he would sink or swim with New Orleans," in a great railroad scheme, that was deemed essential to our prosperity, little did he—little did the general public think that anything else was wanting to insure that prosperity but *railroads!* so successful had been the assertion that "New Orleans was one of the healthiest cities in America," in spite of the most unequivocal proofs before the public to the contrary, evincing a self-love, that a public, gullible always, upon that point, is so prone to swallow.

Value of knowing the truth.

Cost of ignorance.

It required a great calamity, like that of 1853, to open our eyes to the actual truth. A conviction of an error must precede its correction. A knowledge of causation must precede the application of the means of prevention. On the important subject influencing the health of the community, "ignorance is not bliss." The cost to our city, to reach this conviction is to be estimated by millions, and to her commercial prosperity—to the value of her real estate—to the reputation for perennial insalubrity—figures cannot calculate it. But how shall we estimate it in the orphanage—the widowhood—the loss in valuable citizens—in the products of labor! Shall we say then, that all this *could have been prevented?* Have any preventive means been tried? Have there been any organized sanitary measures? Is not all the world benefited by them? Does not the common sense and common experience of mankind here coincide? Are we to take advantage of what this teaches us, or are we to be an exception to the balance of the world? Does here flourish

No attempt to alter it.

The real mortality for half a century.

perennial health, and have we found out the perpetual elixir? The record in chart A contains what has been the memoria, the terrible memoria of the past, and it belongs to the present people to say what that record shall exhibit in future. I invite attention to this chart now merely to show what has been the mortality of the city for half a century, (I shall direct attention to it hereafter for other purposes.) There may be errors in it, but where records of the past are so difficult to be obtained as they are here, it was impossible to do better.

Average mortality for half a century.

This record then exhibits an annual average mortality during that long period, including the disastrous year 1853, 59.63 per 1,000 of the population—*more than double* what it would doubtless have been, had proper sanitary measures been adopted and efficiently enforced at an early period. To what this large mortality is to be properly ascribed, will be pointed out in its proper place, and we shall then see if our situation will admit of corrective measures or not.

The true wealth of a city.

The wealth of a city depends mainly upon the number of its inhabitants—labor is wealth—population and labor are its most productive elements;—a system of measures that is irrespective of the *poor*,—of the immigrant,—of that class that has raised this city from the *swamp and made it what it is*:—that has cleared the land and drained it,—made the streets—constructed the dwellings, and done so much to develop its destiny, is void of justice to the laborers who are worthy of their hire, and is a reflection upon the proprietors who profit by it. The value of real estate rises with competition where there is no overplus in market—the quantity of merchandise sold, depends upon the number of consumers and purchasers. If there is increased risk and jeopardy of life, an enhanced price is put upon every article sold. High food, (when we ought to have the cheapest market in America)—clothing—merchandise of every description,—high rents,—low real estate,—high wages for mechanical labor of all kinds—high price for professional talent;—these are the real reasons, as I am informed by intelligent merchants at *home and abroad*, why we have the dearest market

The real cause of the high price of everything.

in the United States; for comparatively few will risk their lives or trust their capital, *without additional compensation*, for the additional risk run! Hence the inevitable result, a retardation, if not a blasting check upon commercial prosperity and advancement, and finally, a recklessness of life, and corruption of public and private morals. Disease and crime have a similar paternity. They are twin sisters; as exists the one so flourishes the other, and there is not a doubt in my mind, that the most *effective means of advancing the cause of morals and religion among us, would be the establishment of sanitary measures!* "Cleanliness is next to godliness."

Insalubrity and immorality have a similar paternity.

It is assumed by statisticians after a very thorough examination into the subject, that a mortality of two per cent. or one in fifty, may be fixed upon as a healthy and natural standard of mortality. Attached to the late census returns for 1850, the average mortality for the Eastern District of Louisiana was 20.68 in a 1,000, and in the Western District 21.25 to 1,000, and the average of the entire State 20.92. This was a large average for Louisiana, admitting the correctness of the returns —for 25 per cent. of the mortality of that year was ascribed to an exotic to our climate (Asiatic Cholera.) The whole of England averages 21.80, one of the healthiest countries in the world. Throughout the United States the average is 22.47. The average age of death in England is 29 years, while in America it is but 20. The annual average mortality of the six or eight principal American cities, is a little upwards of $2\frac{1}{2}$ per cent. In the three principal cities of England, it is something more. Is it possible then that $5\frac{96}{100}$ per cent., and for the last six years in this city *preceding* '53, it has averaged $6\frac{3}{4}$ per cent.! and this from official *published* sources, is the natural mortality? Is it possible, I say, that this is a *necessary and inevitable* state of mortality? Will the worst enemy of New Orleans allege for a moment that this cannot be remedied? Is our local position—climate—are the pursuits, character and habits of our people so utterly irreconcilable, or unamenable to all sanitary influences, that this enormous mor-

Average mortality of the State.

Of England.

Of the United States.

Stigma of insalubrity.

tality is to continue, and that we are to bear the stigma of being not only the sickliest city in the United States, but in America,—nay, even in the civilized world? It is not only a stain upon the climate and position—but upon the character of the population, and the generally admitted influence of intelligence every where. Did I think so—I should not pen these lines.

Sites of cities not selected on account of their salubrity.

The primary object in the location of sites for cities, has never been, as it should be,—for the enjoyment of health,—the leading idea has always been,—its convenience for commerce,—business, or political purposes. The consequence has almost always been a great penalty in the sacrifice of life, to subserve these subsidiary purposes; and the most expensive means have been resorted to, to correct it, and usually with success. These remarks apply in a remarkable manner to our city—robbed from the swamps—with large bodies of water all around us—a hot climate—a rich earth teeming with organic remains, we have aggregated together *precisely the materials* with only the addition of a large and crowded population, for boundless insalubrity, although second to no city in the world for commercial purposes, that this result should ensue is not only not astonishing—but it would be the operation of a constant miracle were it otherwise, we have synthetically the very materials for its theoretical existence. Under such circumstances, what does common sense dictate? The answer at once will be—correct it—do, as all other cities have done and not lie idle and indolent, resting satisfied in boasting that it was one of the "healthiest places" in *former times* (when there was *no city* at all!)—but put your shoulders to the wheel, rectify the disadvantages of your position in this respect, and take courage in viewing the stupendous works that have been made to improve the sanitary condition of ancient cities—that yet in their mighty relics, are still standing monuments of the great value those people placed on health, and their confidence in sanitary measures to preserve it. It has been said on high authority,* that the climate of Petersburg, in Virginia, during

Bad locality of New Orleans, if not improved.

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* Dr. Jackson.

Petersburg once very fatal; extent; and do. of Bristol; but corrected.

And do. of others.

On what depends the improved health of the Northern cities.

our revolutionary war, was so fatal that no native of the place survived his 20th year. It is now a healthy locality. It has been more recently known that at Bristol in Penn., so great has been the mortality from the influence of neighboring swamps, that from its first settlement, not above two or three children, born there, have arrived at maturity—and this continued until the swamps were drained. Wilmington, Norfolk, Savannah and Louisville, were annual sufferers under the most disastrous fevers, an investigation into and a removal of the causes have restored them to salubrity. The same remark applies to all the northern cities—Philadelphia particularly, (as will be shown by-and-bye) has suffered as much by yellow fever as New Orleans—nay it has been more fatal there, than here, (*even including our last sad year.*) Now she suffers only an occasional out-break, when her sanitary measures have been neglected. The recent occurrence will be found hereafter only a confirmation of this remark. The same remarks are applicable to Baltimore, New York and Boston; they each of them for the time being have had their filthy or infected localities, when their sanitary measures were not properly enforced; but all intelligent practical men among them admit, that the great improvement in their public health, and particularly their freedom from yellow fever, is owing mainly to the strictness of their police regulations. What insurmountable obstacle exists in the position of New Orleans, that prevents her being benefited by the same means?

Experience abroad.

Much light can be thrown on this subject, by reference to the history of other nations (of the old world) as to what has been effected by sanitary measures. In their true interpretation they are but the application of the arts, purposes, comforts and science of civilization to the promotion of health. That this has been extended in proportion to the attention paid to them and that when this has been withdrawn and a relapse into comparative barbarism has resulted, the mortality has increased. It should be gratifying to the pride as it is flattering to the industry and intellect of man, that through their constant efforts only, the salubrity of any spot (not salubrious from position) is main-

Man's situation dependent on his industry and intelligence.

tained; when these are relaxed, or when prosperity and civilization decline, the seed of disease, are, as it were, immediately deposited in the earth. There is scarcely a civilized nation of any note mentioned in history, whose progress and decline are not illustrative of this truth. In the flourishing condition of empires, disease has been kept at bay—industry and cultivation has kept pace with population, the arts and sciences have flourished, and man has fulfilled the great end of his being. With the decay of the arts and enervation of a people, cultivation has been abandoned—negligence has supplied the place of industry, and the mouldering columns and dilapidated palaces are the sure forerunners of the pestilence that sweeps its desolating besom over the land, and finishes that which man has commenced. The sombre aspect of the Ottoman Empire, and the flourishing condition of Great Britain, furnish impressive pictures of the truth of these remarks—the former being in the most neglected and sickly state—the latter the best cultivated and healthiest country in Europe. It is thus that fate, foredoomed by negligence and ignorance of invariable physical and moral laws, advances to destroy the cherished pride of many ages. Rome once the queen of cities, is following the fate of Babylon, and from the same cause, is daily diminishing in population. Pestilence advances from street to street, and has already become the sole tenant of some of its finest palaces, temples and churches. Rome, indeed, might be singled out, as affording in itself and as a warning to us, a history of most that is interesting in the police of health. When still the capital of the world, in spite of her liabilities, she overflowed with population, and the disadvantages of her position were counteracted by the activity and moral excitement of her inhabitants, the drainage of marshes, the width and durability of her paved streets and the abundant supply of pure water, from her numerous acqueducts for baths and other domestic purposes.* England, in the 17th century, was desolated by a constant

As shown in England and Turkey, contrasted, and with other countries.

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* From an Introductory Lecture, by the author, to his class in the Medical College of Louisiana, December, 1835.

repetition of plagues, they have disappeared under the ameliorating influence of sanitary measures. Such too has been the case in the greater part of Europe ravaged by repeated plagues of leprosy. In several portions of it, the average duration of life, up to the present period, has nearly doubled from the same cause. But a stronger case is presented in Egypt, a country in so many respects similar to our own;—in latitude, climate, and liability to inundation from the great rivers. The plague, (which is in that country what the yellow fever is in this) exists in a sporadic form, every year, and the epidemic form about every two years and where during a recent outbreak (1835) it was fatal to upwards of 38 per cent. of its *inhabitants!*—nay, I may say *natives*, consisting of Negroes, Malays and Arabs, a description of the filthy, crowded, unaired, holes (hardly houses) they live in—the stagnant water and garbage around and a deprivation of every comfort, will readily account for this enormous mortality. An accurate examination into the condition of the classes and circumstances of the various races upon which this carnage fell demonstrated, most clearly, that it existed in exact proportion to the neglect of sanitary measures. It was least among those Europeans, who lived in airy well ventilated houses and severest on those who dwelt in the most crowded and filthy manner. A reference to the history of the same unfortunate country, a successive prey to almost every invader for centuries, will exhibit infliction or suspension of the plague just as proper measures have been adopted or neglected to preserve the health of the people; health, like liberty, requiring eternal vigilance. "During the reign of the last of the Pharaohs, during the 194 years of the occupation of Egypt by the Persians—the 301 during the dominion of Alexander—the dynasty of the Ptolemies and a great portion of that of Rome, EGYPT WAS FREE FROM PLAGUE!* The absence of any epidemic, for this long space of time, was entirely owing to a good administration of government and sanitary police, conquering the *producing causes*

Condition of Egypt.

Mortality with the natives.

Salutary effect of sanitary measures.

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* Report of the general Board of Health, of England.

Consequence of their neglect.

of this most formidable malady, in a climate very similar to our own.* The fatalism of Turkish administration, opposes a barrier to all improvement and one of the finest climates in the world, is left a prey to controlable calamities. The sanitary history of Rome affords us a hardly less valuable lesson. The position is a sickly one—and the average mortality even among her highest class was at one period as high as 5 per cent. To correct this she has left some of the noblest monuments which the hand of time could not entirely destroy—in her vast underground drainage and sewerage, with her neighboring marshes dried, and other sanitary measures. With a neglect of these in her successive revolutions of government—disease again became ascendant, and one of the oldest and most lovely countries in Europe, at certain seasons, is scarcely habitable. The examples might be greatly extended, to show, that by the effect of sanitary measures and extending the comforts of life throughout all classes, and these are but sanitary measures, the average duration of life has been in many instances doubled, and in all, greatly extended.

Awakening of the public mind to the value and importance of sanitary reform.

One word more, preliminary to proceeding in *medias res:* The appointment of the Sanitary Commission has resulted from a conviction on the part of the public that the sanitary condition of the city demanded the most serious investigation; that there had evidently been vast errors in the public mind in relation to it; and, apart from all that *might have been* the condition *of New Orleans at an antecedent period,* and which can be readily credited from what we know of the rural districts now, still common sense required us to look it full in the face at *what it is at this time.* The subject itself is not a difficult one. The difficulty alone subsists in reconciling conflicting opinions. It exists in dispelling the cloud of errors that conceal the truth. It exists in getting men to belive what is against their (apparent) interest, rather than

Where lies the difficulty.

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* Among these was specially noted was the neglect in *draining the marshes* after the *inundation*—leaving so many stagnant pools to exhale their poisons to the atmosphere. This was rigidly enforced during the Pharaonic and Ptolemaic times. GLIDDON

anything intrinsic in itself; here it is all clear enough, it only requires the plainest reasoning from effects to causes, and *vice versa*, it only has to show what has been done a thousand times before, with *but one uniform result!* It is not the object or intention of the Commission to flatter themselves, the people or the place; our object is to deal with *facts*, not to form hypotheses; to show, if we can, if our situation is a remediable one; if from the apposition of the facts, theoretical views shall be entertained or result, we plead beforehand, avoidance of speculative intentions, and trust that the facts themselves will be estimated at their sole value, no more. We earnestly entreat a patient and unprejudiced hearing.

Not in the subject, but in prejudices and ignorance of it.

SECTION II.

Medical Constitution—what of each month—influence of meteorological conditions upon mortality—Prediction of the epidemic in May—its commencement—interpretation of physical phenomena—peculiar climatic conditions—when they ceased, and the epidemic—the cholera epidemic of November and December, parallel between cholera and yellow fever weather and liabilities, and differences—climatic peculiarities of the year—peculiarities of the epidemic influence on man.

MEDICAL CONSTITUTION.

The Medical Constitution is derived from such a combination of climatic and terrestrial conditions as influence the constitution of man. What that constitution has consisted in (in the present case)—we shall show in another section,—constituting the most remarkable year, known in our annals. We propose now to consider, briefly, what has been the meteorological condition and its special influence on the salubrity of the city (of course in connexion with the other condition) in a succinct summary for each month.

Medical constitution.

What.

During the month of January 1853—the maximum temperature was 71—the minimum 33½—the average 47 and the

Do. of January.

range 37½—the average dew point was 44.93—barometric average 30.113—average humidity .882. The highest solar radiation 47° (a most remarkable difference between the sun and shade for the month of January.) Amount of rain 3.190 inches; winds mostly from the North, and weather pleasant.

The mortality amounted to 679. The largest number being from consumption and amounting to 92, and a very uncommon feature was the occurrence of two cases of yellow fever. The whole zymotic class amounted to 133.

Do. of February. During *February* the maximum of the thermometer was 77—minimum 36½, average 56 and range 40.50—the average dew point 50.48—average of the barometor 30.238—average humidity .845—average amount of vapor to each cubic foot 4.579—the highest solar radiation 37—winds very variable—and more from the South and Southeast, with increase of force—amount of rain 4.600 inches. The amount of the mortality was 441; of consumption 83, of the zymotic class 65—another case of yellow fever being returned.

Of March. During *March*, maximum of the thermometer was 78, minimum 43, average 62.63, and range 35—the average dew point 56.17—average of the barometer 30.262—average humidity .832—average amount of vapor in each cubic foot 5.381, the highest solar radiation 40— winds mostly North, and amount of rain 6.870 inches. The amount of mortality was 463; of consumption 90, of the zymotic class 54—of pernicious fever 2—of scarlet fever 14.

Of April. During *April*, maximum of the thermometer was 85—the minimum 50, the average 70.37 and range 35—the average dew point 66.60—average of the barometer 30.260—average humidity .833—average amount of vapor in each cubic foot 6.804—the highest solar radiation 29—winds mostly from the South, and amount of rain 1.848 inches. The mortality was 532; consumption still being the largest and amounting to 80—the zymotic class being 89—scarlet fever 19—measles 20—pernicious fever 5—and diseases of the nervous system 75—a very large increase over any preceding month, more than double that of March, and first showing the impress of what was to come.

Of May.

During *May*, the maximum of the thermometer was 88—the minimum 60—the average 73.82, range 28—the average dew point 67.11—average of the barometer 30.237—average humidity .842—average amount of moisture in a cubic foot 7.601—the highest solar radiation 39—winds Southerly and Easterly, amount of rain 3.840—a largely increased combination of injurious influences. The moisture had greatly increased with the high range of temperature, although the precipitation had been small, below the average of the month—as the preceding had been, eminently showing how erroneous it is to calculate the amount of moisture from the quantity of rain that falls, and the cause of the mistake that some of the communicants to the Commission have fallen into in describing the condition precedent and accompanying the existence of the epidemic, while on the same page, a few lines off, the evidences and effects of *this moisture* are pointed out—in the extensive prevalence of mould; and a vegetable life that alone predominates in very humid weather, and the existence of a stagnant atmosphere, or such winds as are known to be solvent of a large amount of moisture.

Moisture mistaken for dryness.

The high combination then of heat and moisture, with so small a precipitation, together with a most remarkable elevation of solar radiation, greater than I had ever seen it, so early even as January, (see chart,) assured me that the climatic influences were very remarkable, and when I saw the filthy condition in which the city was—the great extent of exposure of the original soil of the city—for gas, water, and other purposes, the digging of the Carondelet Basin, the cleaning out of canals, and the embankments and excavations for railroad purposes, and the reflection on the fatal consequences that these had heretofore always brought on our city, with the chart A before me; this early connection of the atmospheric element with the physical showed, in the combination, a foreshadow of what was to come, and enabled me to give

Grounds for the prediction of the epidemic in May.

a warning as early as the middle of May, in the Academy of Sciences, in this city, of the disastrous consequences that were to follow, and to some scientific correspondents. How that prediction was verified I now proceed to point out.

Early cases

The mortality now reached 671, of which the zymotic ascended to 143, consumption now declined, diseases of the nervous system reached 145. There were only two cases of yellow fever formally reported on the *mortuary record*, though the investigations of the Sanitary Commission have discovered several others, and there were several recoveries during the month from the disease, occurring in different parts of the city, without any intercommunication in private practice, in the upper part of the city.

In June.

Tropical character of the season.

High barometer.

During June the maximum temperature was 91° on three several days, the minimum 73, the average outside as before) 80.73, and inside 81.46, and the range 21. The average dew point had now reached 73.20, its maximum having been upwards of 80, and its minimum 66.3. The average humidity was .815; the average amount of moisture in a cubic foot had reached the large amount of 9.136 grs., nearly three times the amount in January. The maximum solar radiation was 35. It now became greatest at our nine o'clock observation, which, with the almost daily showers, showed the tropical character of the climate we were now experiencing. The rains in May were about weekly; on the 9th of June the rains set in, and fell almost daily the rest of the month. The barometer continued unusually high, as it had done, and which continued during the existence of the epidemic, not finally falling until December, coinciding with an observation of Mr. Prout, preceding and accompanying the outbreak of the first great epidemic of cholera in London, this rise being cotemporaneous with the occurrence of Easterly winds; accordingly the NE., E., and SE. winds now predominated greatly, with that influence on the system they are always known to produce, the first, especially, during our epidemics. The rise was ascribed to the diffusion of some gaseous body through the air of the city considerably heavier than the air it displaced. —The mortality had now reached, during the month, six hundred and fifty-six; consumption, which had formed a prominent feature in the weekly mortality, was now greatly reduced, near to its normal standard; and scarlatina, which seems to be a prodrome of the epidemic yellow fever here, as it is in various other countries, was now reduced to half its mortality during the preceding month, and thence gave way to the epidemic, and scarcely made its appearance again, until December. Precisely opposite was the influence of the season on the class of *nervous affections*; almost keeping pace with the epidemic, it reached its acme at the same time and then declined. The class was unusually large throughout the year.

Antecedence of scarlatina.

Predominance of nervous affections.

The zymotic class began now rapidly to augment. Bilious remittent, pernicious, typhoid, and malignant fevers greatly increased, and more than twenty deaths by yellow fever were reported.

In July.

We are now approaching the limits of that great epidemic influence, which so severely afflicted our city, and extended its ravages in an unprecedented degree, nearly throughout the Southwestern states; in many instances even desolating portions of the rural districts, for the first time. The period of its commencement may be fairly dated from the second week in July. By that time physical agents had sufficiently matured their power to show their influence on man. Let us not exclaim, at this late day, as of old, "*vis est notissima, causa latet.* It is the duty of the profession, standing as sentinels upon the great watch-tower of public safety, (as to health,) to find out the causes of effects so disastrous. Providence permits no evils, without there being corresponding remedies; and these remedies can only be properly understood or applied, but from a previous knowledge of their causes.

Duty of physicians.

No evil without a remedy.

To the meteorologist, to the observer of causes and effects, and the influence of physical agents, the phenomena precursory to, and during the existence of an epidemic, are not at all obscure. The alarm, the agitation of mind, the anxiety for the sick, which usually exist at this period, is not very favorable to exact observation. The difficulty then exists to curtail the exuberance of the imagination, and record the nakedness of truth. A distinguished French traveler, (Chateauvieux,) in describing an epidemic, says: "No visible signs mark the existence or approach of this pestiferous air. The sky is as pure, the verdure as fresh, the air as tranquil, as in the most healthy region. The aspect of the elements is such as should inspire the most perfect confidence; and it is impossible to express the horror which one experiences, on discovering that all this is deception; that he is in the midst of dangers, of which no indication exists, and that, with the soft air he is breathing, he may be inhaling a poison which is destructive to life." Now this vivid description, although generally credited, is mostly a fancy sketch; and the philosophic observer should interpret the facts as they really exist; the "pure sky" is evidence of excess of radiation, and the "tranquil air" is but stagnant, suffocating saturation, or the wind blowing from unusual quarters, laden with moisture, or deprived of it, (as the simoon,) is destructive to the vital principle. The filth and the stinks around him, warn the observer that the elements are at war with his being; that his constant skill must be exercised in the application of corrective measures, and that the equilibrium of his constitution must be constantly maintained. Elemental disturbances did exist, both precedent to, and during the epidemic; and a long experience, of near thirty years, has shown me that they have *always existed;* if they have not been always properly interpreted, it was because the precision of science was not so rigidly applied to the laws of causation, nor were her votaries then required to explain everything, as now.

Interpretation of physical phenomena.

Prodrome of the epidemic.

A disruption of the ordinary catenation of seasons was early apparent. The winter was unusually mild; great and unusual radiation evinced an elemental derangement. Spring came "before its time;" summer leaped into her lap; and this brought, before the system was prepared for it, blighting autumn with its associate diseases—the full force of radiant power, great heat and intense saturation. Here was one branch of the "shears" prepared for its influence; the other was supplied in a most unusual disturbance of the earth, and the presence of excessive filth.

No precursory influence on man.

On man this great epidemic was not heralded (as is often experienced) by the severity of its *avant couriers*; no precursory violence announced the approach of the disease; it was mainly in the atmosphere that that portion could be predicated from (radiation); on earth all was quiet and calm, but, as it often happens with cholera, it was the "torrent's stillness ere it dash below," with a few cases of yellow fever as early as May, as a kind of warning to the authorities, which increased to twenty in June, still unheeded; during July it rapidly, but regularly augmented, at a geometrical ratio, each successive week, and when it reached upwards of one hundred victims a day, our drowsy Councils established a Board of Health!

Great moisture.

During July the maximum temperature was 89°, minimum 71, average outside 79.88 and inside 81.68, (our table in the appendix is limited to outside temperature); the outside had been lowered by frequent rains, as is usual in tropical countries; range 18. The average dew point 72.13, the highest being 80.9, and lowest 66.5, (the day after!) The average daily humidity .825, the *average at sunrise* being .930. The average amount of moisture in a cubic foot being 8.798 grs., the *average at sunrise* being 9.600! The maximum solar radiation was 32°. The rains were now truly tropical, not only in number but amount, having rained on eighteen days and four nights during the month. The thermometer continued very high, and averaged 30.265, its maximum this (as during last month) being 30.37. The predominant winds were now mostly from our rainy quarters, SW. and W., blowing over an extensive region of swamps, and the bed and banks of the river for upwards of eighty miles. But what most distinguishes the month in this respect was the unusual number of calms noted in my register, amounting to twenty-six during the month, showing, nearly one-fourth of the month, the atmosphere to be in a stagnant condition, hot, saturated, filthy. The gutters were, twelve hours after a rain, reeking and bubbling up with gaseous products, all highly inimical to animal life. (I am indebted to my friend, Dr. Benedict, for keeping my meteorological journal this month.) The consequence of all which was a total mortality of 2,216, and the epidemic being fully established, those from yellow fever amounted to 1,524, and the whole zymotic class 1,734.

Great stagnation of air.

Filthy gutters.

In August.

During August all the meteorological and mortuary conditions reached their culminating point, *and about the same period*, as will be seen by reference to the chart B, and the tables C, D, E, in all which this is shown in great detail; the influence and the inference are both clear and indisputable. The maximum thermometer was 91°, minimum 72°, average 81.25, the maximum dewpoint 79.4, minimum 66.2, and average 78; average temperature of evaporation 76.13, average barometer 30.194, average humidity .873, average at sunrise .950, only requiring one-twentieth more for complete saturation *every* morning! this being actually noted at fourteen observations, the number of grs. per cubic foot, on an average for the month. being 9.737 grs., and at 9 P. M., being 10.045. more than three times the amount in January, and at the highest temperature, the highest solar radiation having attained the almost unprecedented height of 61°! although there was but one day during the month that was marked *entirely clear* the whole day, (the 30th,) raining nearly every other day, some days two or three times in succession, and the amount during the month reaching 7.016 inches. The winds were mostly E. and NE., and the number of "*calm*" days, without a parallel here, amounted to seventeen! or, at *sixty-eight observations*, evidence of a close, suffocating, inelastic atmosphere, which, with the antecedents and

High temperature, and almost average saturation.

High radiation.

Unprecedented saturation.

Unparalleled stagnation of air.

terrene accompaniments, most satisfactorily accounts for the unprecedented mortality. This amounted to 6,201, and the mortality by yellow fever to 5,269, the whole zymotic class, dependent upon the same general conditions, being 5.338, besides the "unknown," and diseases of the nervous system 209.

Mortality.

In Septemb'r.

The month of September has been usually the most fatal month, on an average of more than half a century here. This year, however, it was something less than one-fourth that of August. The meteorological condition had materially changed, the maximum temperature being 86°, minimum 60, average 76.23. The maximum dew point 78°, the minimum 50.3, and average 70.93, average temperature of evaporation 72.44, average barometer 30.191, average humidity .857, the highest solar radiation (in the early part of the month, the 4th,) being 45°, winds mostly N., E., and NE.. The rains continued until the 13th, amounting during the month to 5.045 inches, a large precipitation for September. After this there were but two light showers, and the disease rapidly declined with the change in the meteorological condition, which was considerable in every particular. This is a uniform fact, and especially in reference to the hygrometic, as shown by reference to my records of former epidemics.

Great climatic change.

Epidemic retiring.

The whole zymotic mortality was 1121. The yellow fever being 1066, and the epidemic, with the climatic change in the second week, evidently declining—the whole mortality for the month amounting to 1627. Attention is invited to tables C, D, E, which contain the daily meteorological and mortuary condition in great detail during the three epidemic months, and I would gladly add the whole year of both, could the latter be obtained, for the gratification of scientific men, to show how much climatic conditions influence our health, and especially during this remarkable year. In interpreting the connexion of meteorology with *mortality*, two circumstances are to be taken into consideration: First, the amount of vital resistance to be overcome previous to the attack (for it is never at once.) Second, the period to elapse before resulting in death. These, as yet, are undeter-

The mode of interpreting the influence of meteorology on mortality.

mined and irregular, dependant upon individual susceptibility and constitutional power. The second is easier estimated than the first—for the *average* duration of the *disease* is known to be from three to five days. The *period of incubation* is less known. We sometimes find, in the advanced period of the season, that a sudden great fall in temperature produces a frightful mortality; cutting off at once all who are very sick, unless carefully protected; and here a little foresight of a coming change can often be put to most valuable use. In this case it is almost equally apt to prevent the farther continuance of the disease, *provided the change is a permanent one.*

In October.

During *October* the maximum temperature was 81°; minimum 48°, and the average 66, 81; the maximum dew point 74° 5; minimum 31° 9; average 59° 31. The average temperature of evaporation 62.30; average barometer 30 231; average humidity .804; maximum solar radiation 41°. Winds mostly from East and North but two days, on which it rained until the latter part of the month, one night preceding the frost of the 25th, and having rains two days after, amounting in the whole to 5.175 inches, which exceeds the amount of precipitation for any October during the last ten years, excepting that of 1849. Range of "*drying power*" during the month, 30. Here is a great reduction in the destructive elements in every particular, and the mortality greatly declined. Indeed, this has continued pretty regularly ever since the 10th or 13th of September, about which period the climatic changes occurred. These are often more obvious to one's feelings than by our instruments, and the time is not distant when these can be stated more precisely. The mortality from yellow fever during the month was 147; of the whole zymotic class 243, showing that the epidemic feature had almost entirely departed. The entire mortality was 674.

Climatic change continued.

Epidemic, as such, ceased.

In November.

During *November* the maximum *temperature* was 75°; minimum 45°; and average 66.92. The maximum *dew* *point* 69.5; minimum 36.1; average 59,46; average *temperature* of *evaporation* 61°.85; maximum solar radiation 46°. Winds mostly East and Northeast. This direction of the winds has been very remarkable and particularly from the East for the last four months, exceeding the average of the last five years at least 200 per cent. The maximum barometer occurred on the 18th, and was 30.46—a very unusual heighth here—soon after which the cholera broke out. The average for the month was 30.329; average humidity .846. There were but three days of rain until the 26th, '7th '8th, '9th, when they were heavy, and the amount, of precipitation for the month reached 7.032 inches; range of "drying power" 20.

Unusual East winds.

The average for the month was 30.329; average humidity .846. There were but three days of rain until the 26th, 27th 28th and 29th, when they were heavy; and the precipitation for the month reached 7.032 inches. Range of "drying power 20.

The mortality for cholera was 177. The yellow fever mortality was but 28; and the whole mortality 987; and the zymotic class 318.

The condition precedent to and accommpanying a disruption of the cholera here, is irregularity of *climatic movements*—a high and low barometer, and mostly the latter—and a high and low drying power, mostly the former.

In December.

During *December*, the maximum temperature was 68 on the 8th, and the minimum 34 on the 20th—the maximum dew point 65, minimum 24.2 on the 31st—average temperature of evaporation 50.67, maximum solar radiation 25°, winds continued from East, North, Northeast, the maximum barometer 30.48 on the 2d, when the cholera was at its height, and declined to its minimum 29.57 on the 30th, much the lowest point it had reached during the year. Average humidity .823, and the average number of grains of moisture in the atmosphere was 4.167 to each cubic foot, less than there had been since January. There was but one slight shower of rain to the 13th, and this occurred on the 7th; the amount was only 200th of an inch—the total for the month

Great barometric variations.

Air comparatively dry.

Parallel of cholera and yellow fever.

Climatically and physiologically.

Their dew-points.

Do. of winds.

was 4.560, and under the average for *any December.* The cholera ceased soon after the middle of the month. New Orleans was in no condition to *localise it, as at this period there had been some attempt, during our long scourge of yellow fever, to cleanse* the city! This epidemic, so different from its predecessor and incompatible with it, is doubtless influenced by meteorological conditions that differ also. They have never existed here as *epidemics* together, they consequently depend upon somewhat different elements for their existence, as such. The latter requires exalted temperature and high saturation, and is essentially a disease of the hot season—the former exists in a lower temperature, with much less and very *variable humidity* and *great variation of the drying power*, often very exalted, (such at least, has been the case in this climate,) irritating, by rapid evaporation, the mucous surfaces, producing in them an erethism, always a prodrome of the disease—such is just the condition attendant on epidemic influenza—the almost universal precursor of cholera. The dew point is also essentially different in cholera from* what it is in yellow fever. While in the former it varies from 48° to 70°, in the latter it rarely descends below 60° and ascends to 80°—these are very remarkable differences. I speak of that state of the atmosphere sufficiently aggravated to produce an *epidemic* of these diseases respectively. I do not here allude to incidental, sporadic or endemic cases; *they* may occur under circumstances somewhat different from these, and are dependant upon local circumstances that have not been subject to analysis. And be it remembered that I speak of the climate of New Orleans, with the records before me. The predominant winds are also different—while in cholera they are the East and Southeast, in yellow fever they are the East and Northeast.† The individual liabilities are also different; while with the former, a full habit—sanguineous temperament and high living, predispose to the disease, it is a protection to the latter. The one attacks the cerebral and sanguiferous system and mucous surfaces—with the local developments dependant much on the habits and condition of the individual, the other attacks the great system of organic life, giving increased activity to one secretion, whilst paralysing all others, leaving cerebral life, with all its integrity, to the last moments of existence. The one occurs with a high atmospheric pressure, the other under a low one, or this predominates. Both belong to the zymotic class, they are invited and localised by filth—want of ventilation, &c. The difference in the climatic elements may greatly aid in explaining their different effects on the system. Such certainly is the result of our experience here in the several epidemics of cholera which have occurred in this city during the last twenty years, and the very fact that they never prevail together, but successively here, is a proof of the correctness of the remark that it arises from the difference in the meteorological elements, that constitutes the sole or principal dissimilarity in the remote causes, and that, still, if the localising condition, (filth, the hot bed of corruption and vitiation) be not present, immunity is enjoyed.

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* Or lower.

† How deeply it is to be regretted that there is no meteorological record of that remarkable occurrence of cholera here in the fall (Oct.,) of 1832, when the yellow fever existed to a great extent in this city. A *few days* after its outbreak, the yellow fever entirely disappeared, and was thoroughly supplanted by the worst cholera epidemic ever witnessed in this city. Being on a visit to the cholera districts in the North, I did not reach here until it subsided, which was as rapid as its advent, from a sudden fall of temperature with North winds. In the epidemic cholera of the

Pathological differences.

Mortality of the month.

The mortality from cholera, during the month was 332—of yellow fever but 4—of the whole zymotic class 429, and the total mortality for the month 844. The table F, prepared by Dr. Macgibbon, for the Sanitary Commission, embraces the detailed mortality for the whole year, classified, with the months, ages, nativities, colors, sexes, &c., and made as correct as it was possible, under the difficulties of procuring the materials.

After this detailed application of the meteorological condition and its special consequences, in this most remarkable year, it

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succeeding year, I find no record of the dew point in my meteorological journal, (hygrometric observations were only commenced by me in 1834, and have been kept up ever since.) But I find in my journal of the period of the epidemic "a great fall in the thermometer on the 8th June, (and of course the hygrometry) a heavy fall of rain on the 9th. over five inches, and severe thunder and lightning; a change of wind from the Southeast which had predominated, to the Western quarters, and the disease gradually declined, it *reached its acme on the eighth!*" and terminated about the 25th.

will be instructive to review the two conditions productive, in combination, of such disastrous results, and see how they differ from those of other years. If in the appreciation of those at the command of science—the causes pointed out do not seem commensurate with the results, it is to be recollected, that it is but "yesterday" (as it were) these definitive causes have been developed by scientific investigations and applied to human maladies, that in the great store house of nature, the mightiest results have been caused by apparently the most insignificant means, and that in *no human infirmity* can we yet measure the *precise amount of causation.*

Great results often proceed from apparently insignificant causes.

Climatic peculiarities of the year.

The annual *average temperature* in 1853 has been less by about two degrees, and this has occured during the rains, it has been accounted for by Prof. Blodget by the tropical character of the season, the daily curve of temperature being much less sharp during the rainy season, hence the daily mean of temperature is less than usual, this has been specially verified here. *More rain* has fallen than any year during the last thirty excepting a fraction more in 1839.[*] The *barometer* has been much higher than any year I have ever noted it, and continued so until some time after the occurrence of the cholera in December. The *winds* have been nearly one-third more Easterly than during the last five years, and especially during the epidemic; more Northerly—not half the usual Southerly winds, about one-third more of Westerly winds—in this respect, what has eminently distinguished the season has been the unusual occurrence of *calms*, or stagnant state of the atmosphere, for the whole year; it has been about four times as many as usual, and for August more than eight times as many calms as the average of the last five years. The "*drying power*" has been greater for the whole year than usual and especially for December. The *radiation* was materially different, as is usual, in yellow fever years, the highest amount existed during the yellow fever, (and this is commonly in September,)—this year the largest mortality occurred during August, accordingly the highest radiation occurred then. In a series of non-yellow fever years, the culminating point existed in May—vegetation probably then requires it most.

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[*] I was not here in 1847, being absent in Vera Cruz—more rain is alleged to have fallen then.

High radiation and sickness concomitant.

So great is this "drying power" in a climate where moisture is deemed the "*only sinner*," that at times it becomes very embarrassing in the treatment of disease, and it is of great importance to remdy it. It occurs not only in cholera, but in cramp, in rheumatism, in pneumonia, in scarlatina, and sometimes even in yellow fever; it makes the meteorology of the sick room a part of the proper armory of the profession. Covering the body with blankets and bed clothes does not prevent the rapid evaporation that ensues, in a dry period, not only from the surface of the body, but from the lungs. In the more elevated sierras of Mexico, where the perspiration passes off with such celerity, from diminished atmospheric pressure, that sensible perspiration (or sweat) is not often or long seen, there is worn a kind of close woven (or Canton flannel) under garment, that resists this rapid desiccation, and is very comfortable. I am in the habit, at times here, of changing the hygrometry of the sick room by having water poured on a heated iron. Too much dryness, then, may be a cause of disease as well as too much moisture.

Effect of great "drying power."

England, enveloped in her fogs a large part of the year, is, with her *low temperature*, one of the healthiest countries in the world; while New Orleans, with her great moisture and *high temperature*, complicated as it is, with other powerful agencies, is one of the sickliest. The exact amount required for health is a subject for future investigation. The Sanitary Commission has tried, in vain, to procure such an array of facts during our last memorable year, as to justify some generalization on the subject. It is not abandoned; it is too valuable, if such a record *can be* procured of the exact *period of occurrence* of the principal classes of disease of a year so distinguished, as well for its meteorological as mortuary condition, it should be done. The meteorology of it

Difference between moisture and high and low temperature.

we have. But three professional gentlemen, Drs. Benedict Kovaleski and Copes, answered our circular, furnishing *dates of the occurrence of cases of disease during the whole year*—too few for important deductions.* It does not require that statement to show whether meteorology has any influence on man, there is not a day or month of this, or any other year, in which this is not shown to the satisfaction of every mind capable of observing, and not closed against conviction. The contrary supposition embraces the belief, neither more nor less, that man is independent of climate—nay, of external agents—is so absurd that I dismiss it with no further notice than this bare reference to the hypothesis that has nothing reasonable to support it.

Peculiarities of the season.

Creoles exempt.

Influence of color and sex.

In closing this imperfect analysis of the "epidemic constitution," it is proper to refer to those specialities for which this epidemic is entitled to the paternity. Hereafter it will be shown that the fever of this year has been the same in all its essential features with those of preceding years, with the usual variation for season, and that all the stories of its African, Rio Janeiro or West India nativity, are as equally groundless as the importation of the epidemic itself. It is doubtless true that its malignity was hardly ever equalled with us and that there were sections of the city where many cases terminated within twenty-four hours from the commencement. It was remarked that an unusual number of children were attacked, even those born here, *unless both parents were themselves creoles*—a much larger proportion of the colored population than common; the remarkable number of forty-four are reported (although *much less* than in the country)—females also suffered more, and especially those pregnant, than in any year since 1835—a fine miliary eruption was usually seen on the skin within twenty-four hours from the attack—it was the harbinger of safety as long as it kept out—

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* Since the above was written I have obtained, with the assistance of the Sanitary Commission, near 10,000 cases of certain classes of disease, supposed to be most under the influence of meteorological conditions, at the dates of their occurrence, during this interesting year (1853), which I intend digesting with their corresponding meteorology at as early a period as practicable.

its repulsion the signal of great danger if not of fatality; this was followed during convalescence, with troublesome furunculi, throughout the body, it even occurred in many who had not the fever; this same eruption characterised the great epidemic yellow fever of Philadelphia, of '93, many were affected with carbuncles, and in several instances buboes during the fever. The perspiration was offensive even with those who were careful enough to bathe twice a day, the same was noticed of the above Philadelphia epidemic. The appetite for strong food and drink was materially lessened with those who had extensive and exhausting professional labor to perform, and its indulgence increased the exhalation from the body above spoken of. These, however, I have repeatedly observed in former epidemics, a large proportion of the telegraph operatives fell victims to the fever.

Eruption, carbuncles, and buboes.

The stimulus of the generative power, which the distinguished historian of the great Philadelphia epidemic of '93, Dr. Rush, mentions, and the facility of and liability to conception, even with those who for ten or twenty years had ceased bearing, also existed; (noticed here by me, and published in my account of the yellow fever of 1833;) it seemed a kind of law of compensation like that which attaches to the poor in sickly countries; of multiplying their births in proportion to the mortality. The rise and decline of the mortality in the zymotic class (or preventible mortality) has been traced in its successive monthly stages, its culminating point this year being August instead of September as heretofore, uniformly, unless when epidemic cholera shall have been the principal disease; this being essentially a winter disease with us, or at least, occurring at any other season than the summer, it makes the angle in that part of the chart A designating the *monthly liabilities*, much less sharp for September than it otherwise would be.

Law of compensation.

Class III, of monoxysmal or *contagious maladies*, had its greatest prevalence in May, and was at its minimum in September.

In May most contagious malady.

The class of "nervous diseases" had also its culminating point with the highest temperature in August. That of pulmo-

Nervous diseases in August.

Reverses of the pulmonary.

Intemperance most injurious in summer.

Thunder storms and lightning during epidemic.

Unless a hurricane.

Gas in the gutters soon after a rain.

nary affections again reverses the figure. Intemperance reaches its highest amount as the fears of the fever increase, and doubtless added an immense amount to the whole zymotic class. This table shows here, as every such table shows, that the "unpreventible diseases" are a constant quantity, and that our enlightened efforts are mostly to be directed to the variable classes (mainly the "zymotic") which man has (most fortunately), so much power to control. There exists a popular error of the "purifying" influence of storms accompanied with thunder and lightning; it is something similar to that denominating a heavy atmosphere (high barometer) "light"—because with a low temperature it is bracing, and a light atmosphere (low barometer) "heavy." Storms of thunder and lightning, I have noticed for thirty years in this country, to exist during epidemics, and instead of "purifying the atmosphere," to injure the sick; they existed throughout the epidemic here and elsewhere last year, They have been noticed during the epidemics at Rio and Demarara and other places. It is the opinion of many physicians in tropical climates, (Belot at Havana, and others at Rio, &c.,) that this development of electricity increases the cases of yellow fever; that in proportion to the violence of the storms the disease augments in violence and that it aggravates existing cases, (and so in cholera,) unless a hurricane occurs, when (so great is the change) there at once occurs a great temporary abatement of the disease. The frequency of the rains are shown and their amounts during the epidemic months, exhibited in the meteorological tables for those months, in detail. It was remarked also as frequent as the gutters were thus cleansed when stagnant water still remained, that discolored slimy pellicles covered its surface, bubbles would issue, within twelve hours after these ablutions; I called the attention of my chemical friends to it and advised its annalization. It is to be greatly regretted that the arduous nature of our professional duties during a severe and exhausting epidemic curtails greatly our ability to make that extended sphere of experiments which science and humanity both demand, for these are twin sisters, and the measure of the utility of the one depends upon the extent it can advance the other. This is our apology for not accomplishing more in the most memorable year for both that our country has yet known, and we feel humbled at the small offerings we have been able to make at the altar.

Earthquakes during the summer.

It is as well to mention, without knowing that there exists any connexion between them, that there was a slight shock of earthquake at Biloxi about the period of the occurrence of the fever there; that simultaneous with the outbreak of the fever here in May, there were earthquakes in Georgia, and that at the precise period when it was most fatal viz: the 20th and 21st of August; there were earthquakes in Ohio and Thebes, all of these were attended with thunder and lightning.*

SECTION III.

Estimate of the life cost of acclimation in New Orleans from nativity—to the natives of Louisiana—to those of the Southern and Western States—to the Northern States—to the North-Western States—to the British population—to those from the West Indies, South America and Mexico—to those of Great Britain and Ireland—the North of Europe—of Middle Europe—of Western Europe—of the mountainous parts of Europe, and the South of Europe, together with the probable causes of the remarkable differences.

Social position as represented by the cemeteries.

The classes of our population, with regard to their social position on whom this epidemic has borne most heavily, connot be shown by any recorded proofs; and must be left to be inferred from the exhibits from the several cemeteries, in which they were interred, and they are to be seen in Table H. The poor are the greatest sufferers always, and especially in insalubrious places, and during epidemics; they live in more crowded, filthy, and uncomfortable dwellings. They are ignorant mostly of sanitary laws, are unable, or find it inconvenient to apply them, and hence, require the strict surveillance and kindest concern of a paternal government. The most of those who constitute this class, are the *hands*, the *machinery*, that make the wealth of a community, and give it its power; and hence, are the rightful claimants of its fostering care.

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*Meriam.

Cost of acclimation.

Table H, has been constructed from the materials of which our mortuary table of GENERAL MORTALITY has been formed, to show the liabilities of our heterogeneous population to the epidemic yellow fever from NATIVITY. For this Mr. De Bow (our fellow townsman) has kindly responded to my request, and fur-

TABLE H.

COST OF ACCLIMATION,

SHOWING THE LIFE COST OF ACCLIMATION; OR LIABILITIES TO YELLOW FEVER FROM NATIVITY, AS EXHIBITED BY THE EPIDEMIC OF 1853, IN NEW ORLEANS.

		NATIVITIES—STATE AND COUNTRY.	Population in 1850. United States.	Estimated population in 1853.	Estimated mortality from Yellow Fever	Ratio per 1000 of the Population.
1		New Orleans,	38,337	46,004	140	3.58
2		State of Louisiana,			25	
3	Southern States.	Arkansas, Mississippi, Alabama, Georgia, South Carolina,*	2,655	3,176	42	13.22
4	Northern Slave States	North Carolina, Virginia, Maryland, Tennessee, Kentucky,	4,160	4,984	153	30.69
5	Northern States.	New York, Vermont, Massachusetts, Maine, Rhode Island, Connecticut, New Jersey, Pennsylvania, Delaware,	8,898	10,751	353	32.83
6	N. Western States.	Ohio, Indiana, Illinois, Missouri,	1,693	2,030	92	44.23
7		British America,	318	381	20	50.24
				66,945	.825	12.32
8		West Indies. South America, Mexico,	1,693	1,790	11	6.14
9		Great Britain,	3,832	4,598	240	52.19
10		Ireland,	22,093	26,611	3,569	204.97
11	Northern Europe.	Denmark, Sweden, Russia,	491	588	96	163.26
12	Middle Europe.	Prussia, Germany,	14,765	17,718	2,339	132.01
13	L'w Western Europe.	Holland, Belgium,	127	152	50	328.94
14	Mountan'ous Europe.	Austria, Switzerland,	663	797	176	220.08
15		France,	8,306	9,967	480	48.13
16	Southern Europe.	Spain, Italy.	1,848	2,217	61	22.06
			109,679	62,648	7,011	111.91

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* These were not all the States represented by population in New Orleans; but they are all that were debited by deaths from yellow fever, and all that could be estimated from; although there were 26,590 that were necessarily unrepresented in these calculations, most of whom, were colored, however.

nished me, from the U. S. Census Bureau, of which he is the honored and intelligent head, the aggregate and nativities of the population of the city for 1850. That furnishes the first column; upon that I have calculated the population for 1853 for each country respectively, by adding a fractional increase per cent. over that from 1847 to 1850, (the most recent fixed periods;) that supplies the second column. The third is derived from the Cemetery Reports *during the prevalence of the epidemic*, but as there was a large number that was classed as "unknown," it was deemed the nearest approximation to the truth, as in all our records it is little better than *approximations*, to add a large per cent. of these, for such is the negligence herein relation to such records, where there is neither law, responsibility or appreciation, that the statist can only be expected to *approach* the truth, however desirous he may be to be *exact*. These, then, I have divided among the known in the proportion they bore to them respectively. Accordingly, this column was thus constructed, and it is believed not to vary greatly from the truth. It carries, at least, strong probability in its favor. The fourth column results from this, and furnishes the ratio of mortality per thousand of the population. Upon this foundation we arrive at the following remarkable results, which, if correct, furnishes the *cost of acclimation* to every description of our population.

Mode of constructing the table.

The estimate for New Orleans is very imperfect. In the census with which I have been kindly furnished, the nativities of the *city* have not been seperated from those of the *State*, and hence are aggregated together. The mortalities of the natives of New Orleans from yellow fever have almost entirely been confined to those under ten, with very few exceptions, and still only amount to 3.58 in a 1000.

Cast in New Orleans.

While the proportion is shown to be pretty much the same in the range of States along the Gulf and South Atlantic (none being recorded for Texas and Florida,) the *average* shows but 13.22 in a 1000, or about 1⅓ per cent., which is small for the population, and is very small even for bilious fever, and will

Do. in the extreme Southern States.

fully sustain some views in relation to the *identity of the origin and nature of these fevers*, in a future part of this Report.

Do. from the Northern slave States.

The next range of States farther North, being the Northern slave States, or middle States of the Union, are subjected to a cost of acclimation which is more than double that of the more Southern States; it amounts to 30.63 in a 1000, or a fraction over 3 per cent. This was to be expected; the winter climates are as different in their temperatures, as the summers in their hygrometric properties.

Do. from the Northern States.

The next group embraces the *Northern States*, which still farther increases this difference, being 32.83 in a 1000, or nearly 3½ per cent. It is probable that the habits of life between these two sections are more influential in the production of this difference than the climates.

Do. from the North western States.

But what shall we say of the Northwestern States, having an increase over the Northern States of *more than one-third*, or more than three times larger than the Gulf States, being 44.23 in a 1000, or nearly 4½ per cent. This is a large increase, and is not accidental; it is regular. The States of Tennessee and Kentucky, which form the Western part of the group of our Northern slave States, is considerably larger than the Eastern.

Probable causes of this difference.

The great difference in the life-cost of acclimation between the Northeastern and Northwestern States, and those from their brethren farther South, probably, in great part, arises from their habitual indulgence in animal food and general gross living at every meal, more than in any part of our country, or probably the civilized world. This habit is not readily dropped; when they immigrate South the process of animalization is accompanied with the evolvement of great heat or combustion, and is incitive to, and apt to produce fever. This calorific process is but slowly adapted to the requirements of the climate, and the habit and its consequences are productive mainly, in our opinion, of the foregoing results. It is at least suggestive of valuable hints, and should not be lost sight of. Man can adapt himself to any climate, but it is mainly through his living. This is proved by the valuable and interesting experience of Northern voyageurs, who find their crews resist the rigors of a Northern winter in proportion as they adopt the mode of living of the natives. It is perfectly reasonable. Where man resists it, and carries the habits of one climate into another, he pays for it by abbreviation of life.

British America still rises in the scale, and illustrates its value and correctness. It amounts to 50.24.

Do. from British America.

It is equally proved by looking at the small influence from change of climate on those from Mexico, South America and the West Indies, where the great contrast is shown by the exhibit of only 6.14 in a thousand, and doubtless, these derived their liability from coming from districts where the yellow fever is unknown, for the opinion is entertained, by the reporter, that the acclimation to the disease in one climate affords immunity throughout the zone.

Do. from S'th America, Mexico, and West Indies.

So much for the NATIVES of this continent, showing an *average* influence of this change of climate on them of about 12.32 per 1000 in order to acquire perfect acclimation here. Of the *colored population* there are no records but that of death, and the remarkable number of forty-three is given in our mortuary table for last year, a number utterly unprecedented in our annals, although it has been much greater in the country. The *nativity* of the slave population is not given. I do not remember ever to have met with a case of death in the black population during the prevalence of this disease in the West Indies, except during the recent outbreak.

Total, 12 1-3 per cent. for all America.

Mortality of the colored.

The table exhibits, as we proceed down the columns, a still more serious result from change of climate, while the mortality of the natives of France, with their temperate living and habit of adaptation, have now reached 48.13 per 1000; those from England, generally a rather choice population, with fine constitutions, but with national obstinacy in relation to diet, have ascended to 52.19, probably from a much fuller habit of living, not readily adapting itself to the requirements of a warm climate, and at least this difference, if not more, exists wherever these two

Do. from France.

England

nations are exposed to similar influences in a hot climate, and most probably from the cause stated.

Do. from Ireland. Those from Ireland reach the enormous amount of 204.97 in 1,000, showing the consequences of an entire revolution in everything, climate, diet, drink, social habits, all that elevates Cause. man to the dignity of his being, from moral, political and physical degradation and subserviency, with propensities and dispositions the most reckless.

From North of Europe. Those from the North of Europe are also very large, 163.26. The difference of climate is very great, and men will not, until after much suffering, adapt their habits to altered condition.

From Middle Europe. Those from Middle Europe, it will be seen, are much less, 132.01 in 1000, although still very large, and the same remarks apply here as in those of Ireland, although the social change is not so great, and there exists among them greater constitutional prudence. With these, and indeed, all European immigrants, and particularly, among the Irish, a propensity to crowd their families into a small space, with the inevitable result of accumulation of filth, and deficient ventilation, is eminently conducive to a greatly enhanced mortality.

But still, the largest mortality in our table is found to exist among the immigrants from the *low regions* of Western Europe, From Holland and Belgium. reaching the highest elevation of 328.94 in 1000. Holland and Belgium are low, flat countries, with much moisture, which, at a low temperature—with proper comforts of life, is not incompatible with great salubrity, but when these are exchanged for a climate of *high* temperature and great saturation—and these Probable cause. will be shown hereafter to be a material part of the conditions most inimical to health—together with a total disruption of his social habits, the influence on the constitution is most deeply felt, as recorded.

But the climatic change from the high, mountainous regions From Switzerland and Austria. of Europe, (Switzerland and Austria,) with their low temperature, dry, elastic air, and plain food, to the heat, moisture and different social condition which they soon reach here, is productive of consequences, although great, scarcely sufficient to account for the large mortality of 220.08 in 1,000. Elevation then, in a temperate climate, in its proclivity to develop the sanguine or blood-making and heat-producing system or temperament, so different from that of warm climates, where the bilious temperament predominates, and which is so much better adapted to it, must aid in accounting for this large mortality. This is eminently illustrated in seeing how small is the mortality in the natives of Spain and Italy, about one-tenth of those just mentioned, or 22.06 in 1,000, and who are almost uniformly of the bilious temperament, living on a milder vegetable regimen and great temperance, which this temperament instinctively calls for.

Accounted for.

From Spain and Italy.

Probable reason.

SECTION IV.

Total population of the city during the year; estimate of the unacclimated; number of cases of yellow fever in public and private practice; ratios of mortality in each; comparative mortality in other countries; mortality in our rural districts, &c., &c.

The total population of the city of New Orleans, by the United States census, in 1850, was.............129,747.

By adding the ratio of increase from 1850, and carefully and laboriously calculating, from the varied and imperfect returns of the city census of 1851,–'52, for each ward and class of the population, so far as it was possible to procure them, I have arrived at the conclusion that the augmentation, in our aggregate permanent population in 1853, amounted to..............154,132.

Total population in 1853.

It is well know the increase has been much greater, especially of the floating population.

The difference between the population during the last preceding epidemic, in 1847, and that of 1853, is 45,433; to which add 5000, a very small estimate of the floating population, and of that large class of denizens, who have their actual homes here, but are a

Difference of population in 1847 and 1853.

large part of their time absent, and which are embraced in the enumeration of the population of other large commercial cities (more particular in this respect) all of whom are unknown to our census returns, and who generally form the *first victims* of an epidemic; and we have an unacclimated population of 50,433. But as no epidemic so thoroughly influences the whole population, as to leave none still susceptible to attack, and we well know even the last did not, and that was the most thorough and wide pervading we ever had: whole families escaping, and of course, the disease did not stop for the want of subjects. In fact no epidemic so thoroughly influences the entire unacclimated population, in any city, so that none escape; may be from some transient or accidental cause, although they may be subject to it afterwards, as we now well know. During the existence of the plague in Marseilles, in 1720, when *near half the population* fell victims to it, amounting to 40,000—thousands did not suffer at all, out of a total population of 90,000. It is probable that more than double the number was left untouched in 1847 than were taken sick; it is deemed fair to estimate the total *susceptible* population, in 1853, at.......... 60,000. And the entire city population, at..................158,699.

Total unacclimated population.

This will be considered moderate, when I add that our foreign immigrant population, arriving in the city, to the month of June, '53, reached near 24,000, many of whom doubtless remained.

Number supposed to have left the city.

On this as a basis, I have supposed there left the city, before or through the epidemic, and thus reducing our population to that extent,...................... 36,283: being something less than one-fourth. I have come to this conclusion, after a very minute examination into all the records and sources through which this extensive emigration could take place, viz: by the river, and through the lake; by public and private records;

Number in the city during the epidemic.

and deducting the ingress from the egress. To be more sure, I have consulted the judgments of those who have been here, like myself, during the epidemics of the last twenty or thirty years, and there is a pretty general concurrence in the belief that the population, *during* the *summer*, amounted to at least............125,000.

Mortality by yellow fever.

The total mortality, from *yellow fever*, during the year, not only those certified to be such, but a large proportion of the "unknown," *supposed* to be such, from a want of proper records; it is estimated, upon all grounds of probability, to be.................. 8,101.

Ratios to the different populations.

The ratio of *mortality* from *yellow fever*, to the entire *permanent city population*, being the calculated natural increase over the census returns, is 1 in 19.02, or [per cent.] 5-25.

The ratio of *mortality*, to the population supposed remaining in the city, or *exposed*, is 1 in 15.43, or..... 6-48.

The ratio of *mortality* to the population estimated *susceptible, or unacclimated*, (60,000,) is 1 in 7.40, or.. 13.49.

And the total mortality of the year, to the total known permanent population, after deducting all other causes of mortality than *disease*,* was 1 in 10.19, or.. 9-80.

And including all causes of mortality, 1 in 9.76, or 10.23.

To arrive at the number of *cases* of yellow fever which occurred during the year, the details are more precise than have ever been attained here before, but still far from perfect, owing to the backwardness in the faculty reporting their cases.

The reliable returns are derived from the following sources, viz:

	[Cases.]		[Deaths.]		[per cent.]
There occurred at the *Charity Hospital*...........	3312,	of which,	1890,	being	58-84.
The *Howard Association* had, *besides* 429 in the Touro Infirmary, and about half of those in the four Board of Health Infirmaries........	9353,	"	2252,	"	24-09.

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* Deduct from the aggregate, Table F, the following causes of deaths, *not from disease*, viz: "non viable," 13; "still born," 346; casualties, 61; drowned, 105; burns and scalds, 18; hydrophobia, 6; poisoned, 4; wounds, 47; suicide, 14; old age, 5; treatment, 3; (to which ought rightly to be added, intemperance, 123; although I refrain,) amounting to 670, or about 4¼ per cent. of the whole mortality, and reduces this to 15,117; and the ratio of mortality will be as above.

I have not made this correction in Chart A, for previous years, because I had not the materials. The deduction would have, doubtless, been much larger.

		[Cases]		[Deaths]		[per cent
Cases, mortality, and ratios in various public institutions.	The *Touro Infirmary*, of Howard 429; others, 94,..	523,	of which	213,	being	40-72.
	The *Maison de Santé*,..........................	338	"	97,	"	28-69.
	The *Luzenburg Hospital*,..........................	150	"	79,	"	52-66.
	The *Board of Health* and *Howard Infirmary*, No. 1,	343	"	155,	"	45-18.
	" " " " " No. 2,....	338	"	170.	"	51-18.
	" " " " " No. 3,....	1500	"	500,	"	33-33.
	" " " " " No. 4,....	432	"	207,	"	47-91.
	The *City Workhouse*, 1st District,.................	89	"	14,	"	15-73.
	The *City Prison*, 2d District,......................	30	"	5,	"	16-16.
	The *Lunatic Asylum*,..............................	9	"	0,	"	00-00.
	The *Boys' Orphan Asylum*, 4th District,...........	60	"	2,	"	3.33.
	The *Boys' House of Refuge*,......................	21	"	6,	"	28-57.
	The *Girls' House of Refuge*,......................	21	"	1,	"	4-76.
	The *Catholic Female Orphan Asylum*, Camp st...	81	"	4,	"	4-93.
	The *Poydras Female Orphan Asylum*,.............	50	"	9,	"	16-20.
	The *Circus Street Infirmary*, no returns, but estimated about..	300	"	100,	"	33-33.
	To which add, of cases reported to me, and called "outside cases," by members of the Howard Association, and other philanthropic individuals, and supposed same rate of mortality as the Howard's *public practice*,*......	2929	"	705,	"	22-02.
Ratios.	Making the total of *elemosynary cases*, or at..... per cent. or 1 in 3.03.	19479	"	6409		equal to 32.90
Number of cases in private practice.	From various members of the faculty, in the city, whose names are mentioned hereafter, I have had reported to me, localised,.................	7624.				
	From the best estimates the Sanitary Commission is able to form of the location, practice, and number of those who have not reported, it believes they do not exceed...................	1917.				
Total ratios.	The total, then, in *private* practice, to which must be debited the balance of the mortality from yellow fever, amounts to......................... per cent., or 1 in 5 89.	9541	"	1691		17-72
	Making the total number of *cases* in the city, during 1853,................................ per cent., or 1 in 3.58,	29,020	"	8101		27-91

This is the largest number of cases, and the greatest mortality from yellow fever that ever afflicted our city. But it is the least mortality to the number of cases that has ever occurred in a great and malignant epidemic yellow fever,

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* These were all attended by physicians of this city, almost entirely without remuneration, and it is but bare justice to them to say, that they were ever, at the call of duty and humanity, making every sacrifice at the noble shrine; and that, when the epidemic slackened in its virulence here, they generously volunteered to pursue the scattering pestilence into the interior, in aid of their less experienced brethren and suffering fellow citizens. It is with pride we record that no one proved recreant and deserted his post, and that many (fourteen) fell victims to their high professional honor and devotion. Nor was the other branch of the profession less distinguished in the call of duty, and suffered still more in obeying it; more than thirty apothecaries having sunk under it.

Tribute to the faculty; our associations and friends abroad.

such as this was, and it is but fair to claim for our faculty and philanthropic associations, unequalled skill and kindness, in the treatment of the greatest scourge of our country, as I shall presently show. It is but a faint tribute of praise, due to the warm hearts and open purses of our countrymen, in other sections of our happy union, to acknowledge that much of this proceeded from their kind aid, in the deepest hours of our travail we saw that our calamity was felt with electric speed every where, and that relief, accompanied with warm sympathy, came, even beyond our wants; which was then as liberally distributed to our suffering fellow-citizens elsewhere.

Why compare with other cities.

Now, thoroughly to understand our relative *status* to other places, and it can only be done by comparison, let us *en passant*, cast a glance at the sufferings from this disease in other cities and countries, not that it makes our misfortunes any the less. but it is consolatory to know, that other cities have suffered as much or *more* than we have, and are *now enjoying* the blessings of health. It will be made probable that we might, by similar means, do so also, *and it is for that purpose, mainly*, that *I make this comparison.*

Mortality of epidemic; Yellow fever in Philadelp'a in '93-'97-'98.

In PHILADELPHIA, in 1793, the ratio of mortality to those exposed or remained, was	1 in 10
and the ratio to the entire population	1 in 13
do. do. in 1797, the ratio of mortality to those that remained,	1 in 16.6
and to the entire population	1 in 50
do. do, in 1798, the mortality to the entire population was	1 in 15.50
and to the number exposed	1 in 6
The three epidemics of the same city, for 1793, 1797 and 1798, gave an average mortality of the entire population of	1 in 14.24
and of those that remained in the city, of	1 in 10.13
And the mortality to the cases attacked in the epidemic years, from 1793 downwards varied from 1 in 1.2, in 1819 to 1 in 3.86 in 1805, giving an average for all these epidemics of	1 in 2.12

Average hospital mortality.

The loss at the Hospital alone during the epidemies of 1793, 1797, 1798, 1799, and 1802–'3, the only years in which the admissions were recorded, varied from 1 in 1.68 (1799) to 1 in 2 (1803,) with an average for the six seasons of 1 in 1.867.

In these several attacks of epidemic yellow fever in Phila-

Where most fatal.

delphia, it was remarked, that it was much more fatal in the low filthy malignant atmosphere of some districts, than in those where they were more elevated and airy---in those in wooden houses than in those of brick. This is found to be the case every where.

In New York, Baltimore and Charleston.

Mortality in New Orleans.

The general mortality to cases in New York, was about 1 in 2; in Baltimore, 1 in 2.87; in Charleston, about 1 in 4 of the cases fatal, on an average of the several authorities. In Savannah the number of persons dying of autumnal diseases to the whole white population was in 1817, 1 in $9\frac{2}{3}$, and in 1820 1 in 5.1–10. In Natchez, on an average of a number of years, the mortality to cases was 1 in 2.13 and 1 in 16 of the population. In Mobile, 1839, and 1847 the average mortality to cases, was estimated at 1 in 7. The mortality to the cases in the epidemic here of 1820, was 1 in 6 in adult whites, in various description of persons; as women, children, blacks, 1 in 10. The average in New Orleans in a series of years to 1849, the mortality was 1 in 4, this, however is taken mostly from the Hospitals, in private practice about 1 in 8 or 9, and the proportion to general population as 1 in 55. From an estimate I made some years ago, from the results in private practice, there is some difference from those above, which are obtained with the preceding interesting historical statement, from the reliable authority of Dr. R. La Roche, in Philadelphia, mine made the mortality in private practice to vary from 1 in 10 to 1 in 20, while those in Hospital did not vary greatly from those in our public institutions last year, with the exception of being from about 10 to 15 per cent. less. During the late epidemic, the statements, as usual, were conflicting and imperfect—no estimate that is entirely reliable can be formed of it, in private practice; I have averaged it at 1 in 5.89, it is impossible from obvious circumstances, to arrive at the exact truth, it no doubt varied from 4 to 50 per cent.

During 1804, not less than twenty-five cities and towns were visited by the fever, in *Spain*; the population amounted to four hundred and twenty-seven thousand two hundred and twenty-eight, of which fifty-two thousand five hundred and fifty-nine, or 1 in 8.12, perished. In fourteen of these places, at different periods, the mortality, in proportion to the population, was 1 in 6.42; the extreme being 1 in 2.25, and 1 in 13.3. In seven places, the proportion of persons affected, amounted to 1 in 278 of the population; the extreme being 1 in 1.18, and 1 in 5. In twenty-one, the average proportion of deaths, to the number affected, was 1 in 3.087; the extreme being 1 in 1.3, and 1 in 6.42. While two hospitals gave a mortality of 1 in 2.15 of the number admitted, with extremes of 1 in 11, and 1 in 282.*

In Spain.

In the *West Indies* it is often difficult, as it is here, to obtain exact records; the public and private practice being so different. In the government military hospitals, in Cuba, the mortality from yellow fever is very small, not exceeding often, (if the statistics, as published, can be relied on,) two to five per cent.; while in the hospital for the reception of the poor, it is very large, as large as any where.

In the West Indies.

In *Vera Cruz*, the mortality in private practice is very small; the treatment being very mild and simple. While in the military hospitals, with the Mexican soldiers coming from the *tierras templados i frias*, (upper country,) it is frightful; sometimes nearly the whole dying, and the whole per centage is that of escape, which is very small! The filth of the hospital, and intemperance of the men, being very great. The details will be given hereafter, when we come to show the influence of sanitary measures upon it, and the comparison of other Southern cities with New Orleans.

At Vera Cruz

In Rio Janiero, from the highly valuable information the Sanitary Commission has received direct through the United States Consul, Robert G. Scott, Esq., (who has sent many valuable documents; see proceedings,) exhibiting a remarkable proof of the protection, and assimilative influence of climates, on these diversities, all exposed for the first time to this (then) new malady—affecting them respectively as follows:

Ratio of mortality of different classes at Rio.

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* Dr. La Roche.

	per cent.
On native Brazilians, about	2
On negroes of recent and former importation, from	1½ to 2
On acclimated, (to that country,) Europeans,	5 to 6
On the unacclimated and sailors, a mortality of about	30

Mortality in the interior.

In the interior towns of this and the adjoining states, the mortality to the cases, as also to the population, was, last season, much larger than in this city, many villages being more than decimated of their population; of the mortality to cases, probably nearly half dying, in many places. This can only be accounted for by a want of familiarity with the disease, and not having proper nurses. In this city, where these exist, it is probably as successful, in the *same description of subjects*, as it is any where. In Havana and Vera Cruz, with a Spanish and Mexican population, and from the South of Europe generally, whose inhabitants are not given to intemperance, the mortality is very small. Indeed, with them, it is not considered the most dangerous form of fever, nor can it hardly be deemed so here, in good subjects, with proper care and attention.

Great mortality from yellow fever abroad.

Professor Dickson, says; "Yellow fever must be viewed as one of the most destructive forms of pestilence, exceeding even the plague perhaps, in proportion to mortality. In 1804, in Gibraltar, out of a population of nine thousand civilians, but twenty-eight persons escaped an attack, and the deaths amounted to more than one in three. Musgrave gives a scarcely less terrible account of it in Antigua, in 1806. In Jamaica, under the care of Dr. Hume, three out of four died of it. In the city of Philadelphia, in 1820, there died eighty-three out of one hundred and twenty five, about two out of three." During the late outbreak of the yellow fever, in Philadelphia, there occurred one hundred and twenty-eight deaths, out of one hundred and seventy cases, in public and private practice, making a mortality of 1 in every 1.48, or seventy-five per cent.

It will be apparent from these statements, that yellow fever is a much more fatal disease in Northern than in Southern climates. The subjects differ as much as the treatment and the climates.

SECTION V.

Epidemic Constitution—Its Constituents—Proof—Influence on Vegetable and Animal Life—Meteorological Elements—Terrene do.—Difference of an epidemic from an Endemic—An Epidemic cannot be Imported—Epidemic requires localising causes for its development.

Having thus shown the special medical constitution and of its disastrous influence on man—and contrasted its effects here with what it has displayed, not only in various parts of our own country, but throughout the yellow fever zone; we now proceed to approach it a little nearer and ascend to its *causes.* Let us scrutinize these, as well general as local, that we may thoroughly understand our *status*—the *principle upon which it depends for existence*, and by a practical application draw useful lessons from it,

I proceed then to exhibit the evidence, which proves, first, that a great epidemic constitution, or what has been denominated "epidemic meteoration," existed; and secondly, what, were the probable causes or CONSTITUENTS of it.

Division of the subject.

We have evidence of the existence of a great epidemic yellow fever in 1853, not only over the city of New Orleans, but over a large portion of the Southwestern part of the United States; from its effects on nearly all the forms of life, animal, as well as vegetable; that there were some vast influences let loose or developed, or some apparent irregularity in the ordinary elements of existence, that was at war with its being, that is essential to be understood, in order to derive the necessary aid to counteract or control them. It is of vast practical value then to know the CONSTITUENTS which composed it, if they be susceptible of analysis, for it may be considered a settled opinion with all intelligent men, that *epidemics derive their power and spread themselves* from certain *unusual circumstances*

Epidemics formed of certain constituents.

and conditions, that these are required to give them activity, and the important fact is clearly inferable that being the *sine qua non*, THEY FORM THEM. This, in the nature of things, from its wide pervading, direct and almost immediate influence over an extensively spread population, must be atmospherical, and we state them, en passant now, to be more specially mentioned hereafter, that the admission of this principle—the admission of a wide-spread *atmospherical element as a necessary constituent, draws after it an important, if not inevitable inference, in its being a conclusive answer to all averments of its contagious qualities!*—not that a contagious disease cannot become epidemic (although it is very rare), but the difference is, that a contagious disease *never looses that quality, and epidemic disease does, directly it is removed out of the sphere of the epidemic atmosphere*, which always has bounds and limits, however extensive it may be, and beyond the influence of the localising conditions which will be pointed out hereafter. The testimony in support of this, which the Sanitary Commission has obtained, has been most ample and conclusive. We make it as our offering to the vast proofs with which medical record abound on this important subject.

If epidemic, not contagious.

An epidemic disease is known to prevail when a large number of cases of disease, of the same type and character, break out, either simultaneously, or within a brief period, over a considerable extent of a city or country, *wearing one general livery, and evincing and maintaining a sway over all prevailing diseases.* The statement of this proposition, is to carry conviction of its truth to all those who witnessed the characteristics of the disease last summer, when forms of morbid action, that were not suspected to be yellow fever, from wanting its prominent symptoms, were suddenly terminated by black vomit. Indeed, so fatal was its influence in many cases, that nearly, and in some cases all its stages, were merged in the last and unequivocal one—the fatal black vomit, as a child in the nurses arms, in others, in a vain attempt at vital re-action, the system sinking in the effort within twelve hours;

Proof of an epidemic atmosphere.

so virulent the poison, so futile the recuperative principle. The general uniformity of its type, its speedy prevalence over the entire city, breaking out in distant and disconnected parts at the same time, and by-and-bye, extending over its entire area, and thence, as we shall see, to different parts of the country, not immediately, even in those having hourly communication with the city, but many weeks afterwards, as the combined principle (meteorological and terrene) became matured and extended, with a greater or less prevalence and intensity of the *localising* causes, to be mentioned hereafter. Farther proof.

It is farther proved from its reaching insulated places, as jails, penitentiaries and lock-ups, heretofore exempt. Even insulation on a plantation did not always exempt the inmates; in the tardiness and great length of convalescence (taking about double the usual period,) the great liability to relapse, from the deficiency of re-action in those that continued in the epidemic atmosphere, and the rapidity of restoration on a removal from it. Do.

Hence then the atmosphere constituted wings for the propagation of the general epidemic and localising conditions gave it a habitation in various places.

What is meant by an epidemic atmosphere then, is the presence of certain elementary constituents or their combination different from the habitual or normal condition. We shall essay hereafter to state, in what these consist. We haye no proof of anything *specific*, beyond this combination, and this is *two-fold*, the meteorological part probably forming the predisponent, is innocuous without the other, it is but one blade of the "shears," the second is the local circumstances and influence—the true localising or fixing power. It is what has been denominated by high authority, *"the test and touchstone of poison"—that produces its development whether acting on individuals or communities, filth in every kind, degree and sense, represents our meaning. For an atmosphere to prove epidemic pre-supposes the pre- Epidemic atmosphere. What.

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* Mr. Simon.

Its great value.

Contagion independent of external circumstances.

sence of both. If there is only one of them present, (and either one of them is the same) the effects do not take place. If a case is carried from an infected locality to one that is pure, it does not spread; but if conveyed to a place where there exists an impure, kindred or infected atmosphere, the disease is propagated, and it seems, to the superficial observer, "contagious," and hence arises the establishment of one of the great "false facts" in physic, and the foundation for endless, but ridiculous controversies to the disgrace of science and the injury of humanity. Instances corroborative of each of these conditions, are furnished in another page. The special characteristic attribute of contagion is that it is irrespective of external conditions; it pays no respect to climates, zones or seasons; it requires no special atmosphere—it yields to none; it is self-propagative and progressive, and dependant upon its own creative and self-sustaining powers. To *none of these has yellow fever any similitude.*

On vegetable and animal life, formerly.

Soon tainted butcher's meat.

Birds driven away, and killed.

Certain atmospheric appearances have been often observed here, during the cholera epidemics of 1832 and 1833. The dark murky "cholera cloud," as it was then denominated, hung over our devoted city, like a funeral pall, as long as the epidemic continued, and struck every heart with dismay. The experiment with meat, has been often tried during a cholera epidemic, and it usually became putrid, if somewhat elevated in the atmosphere, and filled with animalcules. This, however, is believed not to be remarkable, as it would take place at any season. It was observed here last year that butcher's meat became earlier tainted in the stall than usual. Birds and beasts have been driven from their usual haunts, into the deepest recesses of the forest, showing by their instincts that they were sensible of some malign properties existing in the bosom of that atmosphere whence they derive their main vital influence. At Lake Providence Judge Selby noticed that the feathered tribe almost entirely disappeared during the prevalence of the epidemic. In a former outbreak of cholera, on the "coast," it was observed that the carrion crows ceased to make their appearance, although there were plenty of dead cattle exposed in the fields. An unusual influence on animal life has been often remarked during the existence of cholera here. In Spain, so malign has the air been sometimes found during the existence of yellow fever, that birds confined in their cages have died. The older records in our profession, of periods when epidemics raged with one hundred-fold more violence than they have done in later times, almost every species of animal life suffered—nor do I know of any reason for the comparatively lesser influence of epidemics of latest, over ancient times, than the extension of the comforts of life, and the refinements which civilization has wrought, which, really, are nothing else but sanitary measures.

Its influence on animal and vegetable life in the neighborhood

Nor are we without evidences of the extension of such influence to the vegetable creation. During the late visitation, Mr. Lawrence, who is engaged largely in horticulture, in the lower part of the city, informs me that his garden seed would often fail to germinate, but still more often, when they would sprout up a few inches from the soil, a sudden blight would seize them, and in a few days they would wilt and die. This was eminently the case with the cauliflower, the celery, the cabbage, raddish and other vegetables. To keep up his stock, he, in vain, applied to his neighbors, to those on the opposite side of the river, and down the coast. The same influence had been extended to them. Many of his fowls died, old and young, without previously appearing sick. These effects only continued during the epidemic. In other parts of the country similar effects were produced in the destruction of the various kinds of poultry, in the tainting and destruction of orchard fruit, and a blighting influence of various forms of vegetable life; and on the coast of Texas the fish were found dead in immense quantities, as reported to the Sanitary Commission, viz:

Epidemic influence on fish on the coast of Texas.

Biloxi.

At Biloxi, the peaches rotted on the trees; great mortality existed among the fowls; flies and musquitoes remarkably numerous; mould on the trees; heat unusually great; thermometer 94°; two earthquakes during the season; many cases of yellow fever, without personal intercourse, with any sick of the disease.*

Bay of St. Louis.

At Bay St. Louis, there was an epidemic among fowls.

Bayou Sara

At Bayou Sara, the China trees had a sickly appearance and their leaves covered with a crustaceous larvæ.†

Centreville.

At Centreville, musquetoes and flies more numerous than ever observed before; and mould of a drab color, and very abundant; season unusually wet, and heat of sun *very* great.‡

Clinton.

At Clinton, musquetoes uncommonly numerous night and day.

Baton Rouge.

At Baton Rouge, "fruit of the peach full of worms, and potatoes rotted in the ground."

Lake Providence.

At Lake Providence, "fowls very sickly and many of them died; animals and plants sickly—many had bumps upon them; musquetoes tenfold more numerous than ever known before; never saw one-twentieth part of the mould; toadstools vastly more plentiful than heretofore; a peculiar smell pervaded the atmosphere of the place." §

Port Gibson.

At Port Gibson, dark and unhealthy spots on the peaches; bright and bluish mould very common on the grain. Dr. McAlister writes that during eighteen years of close observation, he had never seen such repeated floods, attended with such an excess of thunder and lightning, succeeded by such hot sultry days, during the latter part of the summer. The city occupies a level locality on a rich alluvial soil, and presented during this time, the appearance of a marsh.

Natchez.

At Natchez, epidemic among poultry (fowls); musquetoes very numerous, and the epidemic particularly severe with pregnant women.‖

At Washington.

At Washington, Miss., epidemic among poultry (turkeys) taking off entire stocks, without apparent cause; their livers found greatly enlarged and diseased.¶

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* Drs Byrenheidt & Cochrane. † Brown. ‡ Dr. Wood.
§ Judge Selby. ‖ Dr. Davis. ¶ Prof. Wailes.

At Gainesville, fruit rotting prematurely and extensively; native cows dying in great numbers, without obvious cause.

At Gainsville.

But fortunately for the interest of truth, the recent progress of science has not even left this hitherto dark corner, without other rays of light, with which to illuminate it. The Smithsonian Institution, in the noble language of its founder, established "to extend knowledge among men," is spreading the enlightening rays of science over every region of our country. I am indebted to the kindness of Professor Blodget of that valuable institution, who has most obligingly answered the queries I have addressed him upon the subject, for the subjoined information, containing direct and conclusive proof of an *epidemic atmosphere*, showing, most satisfactorily, that wherever the epidemic influence was felt by man, *there* was *exhibited proofs through meteorology*, of the existence of that atmosphere, that this prevailed to a most remarkable extent, that, notwithstanding the advanced period of the season and the presence of a remarkable elevation of temperature—*that* is proved not to have been a sufficient meteorological ingredient to constitute the epidemic constitution, and that the disease did not become developed until there was superadded to this, *high saturation*, affording demonstrations upon the subject, it is believed, never exhibited before.

LETTER FROM PROFESSOR BLODGET.

" *The Temperature Comparisons.*

"The comparison of mean temperature, at various stations embraced in the district over which the yellow fever extended at sometime during the summer, with the mean for a series of years, or for 1852, shows, on the whole, a greater number of negative than positive differences. Yet the inferences, supported by the first view, of a colder or less tropical summer temperature, are the reverse of truth, as may readily be shown. The daily curve of the temperature is much less sharp in the rainy summer of the tropics, than in the latitude of New Orleans, in usual seasons. When, therefore, a temporary institution of this rainy and humid tropical summer occurs in these latitudes, the mean temperature deduced from the usual observations is too

Information of epidemic influence from Smithsonian Institution.

Rainy season depresses the midday temperature, and elevates the morning and evening.

Tropical weather in New Orleans, in 1853.

low, and the true mean, also, lower than usual. Thus, in the rainy season of Central America, the mean for July descends to 77°, deduced from the usual hours; while in Texas, it rises to 85°. At Fort Brown, on the Rio Grande, July, of the present year, was dry and healthy. In August the tropical rains set in, and, with the same morning and evening temperature, the midday mean fell from 92° to 88.7°. The same result occurred at New Orleans, in the contrast of June and July, in a still more decided manner, the morning mean rising, in July, 2.5° above that for the same hour in June, and the midday mean falling 2.5° below that of June. The daily curve, from minimum to maximum, was thus diminished during the rainy month of July 5°, and was actually but 4.4°, an unprecedented low, and peculiarly tropical curve.

And extended throughout the stations.

"Comparison of all the stations here given, in this manner, would prove the apparent low temperatures they exhibit, to have been *the institution of conditions approaching the tropical climate more nearly than in any year of which we have precise record.*

Equal to a removal 10 deg. farther South.

"In further proof of this position, the great and general heats of the summer on this continent may be cited. A change of ten degrees of latitude, Southward, would give about the precise measures of temperature and humidity actually experienced on the continent. With this general accession of temperature, the humidity, and sanitary consequences, follow inevitably.

Rains as shown by the Table.

"The amount of rain, as a rude measure of humidity, is given at several stations, in comparison, also, with the means of a series of years.

Frequency of rains, next to amount, evince tropical conditions.

"Frequency of rains is next to amount; and in the present case is particularly important. The stations are thus distinguished in connection with the tables of amount.

"To group the results: South Florida only was profusely rainy in June, except for the last half of the month, when New Orleans became remarkable for frequency of rains. In July Texas was very dry; New Orleans the reverse, with tro pical frequency of rains. In Northern Florida and South Carolina the rains were heavy, though not unusually frequent. In August the tropical rains of New Orleans continued, and began at the close of the month in lower Texas. In September they spread over the Gulf coast East and West of New Orleans, and diminished at that point. In October they were continued on the Rio Grande, and at Bermuda, and other islands, and over most of the Gulf coast also.

Rains and fevers cotemporaneous.

" *The yellow fever began on the Rio Grande with these rains in August, and continued till they ceased in October! It began in other parts of Texas with the same conditions, and so at Mobile, continuing with their unusual continuance.*

In Texas and Mobile, fever and rains simultaneous.

Humidity.

" The mean humidity or per centage of saturation, is given for the observed hours, and for the mean of the whole month at several stations in the South and West. June is seen to have a low fraction of saturation in all parts of the United States, *except at New Orleans,* where, with a temperature 3° above the mean, the saturation was unusually high. In July the fraction of saturation at New Orleans largely exceeded that at any other locality observed, Savannah, Ga., approaching it most nearly. In August it was largely increased at all stations; in Texas and at Savannah becoming nearly as great as at New Orleans in June. In September it was slightly less at New Orleans, and greater in Texas, and Eastward from New Orleans, at Mobile, &c. October had mainly a high temperature and high fraction of saturation."

Simultaneous occurrence of the fever with high saturation and elevation of temperature.

For proof and illustration of these positions, reference is made to the tables J, K, L, and M, subjoined, containing records of temperature, rain and humidity, throughout and beyond the epidemic region of last year, and the averages of other years, with which to compare it. The whole is most conclusive.

TEMPERATURE, RAIN, AND HUMIDITY, OF SAVANNAH, PENSACOLA, AND JACKSONVILLE, 1852—53.

	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec,
MEAN TEMPERATURE.												
Savannah,... 1852....	.....	.....	.....	.....	73.04	75.44	79.98	77.84	74.47	.....	.....	.....
" " 1853....	47.88	54.40	59.50	68.11	74.00	79.00	81.50	79.33	75.83	64.50	60.40	48.40
Jacksonville, 1853....	.....	.....	.....	71.86	77.29	78.89	81.74	82.56	77.55	68.92	64.28	53.45
Pensacola,...1852....	.....	.....	....	.....	75.67	78.00	.....	81.00	78.00	.....	.....	.....
" " 1853....	51.33	57.04	63.58	69.67	74.25	80.22	82.08	82.38	78.42	69.56	65.67	54.94
AMOUNT OF RAIN.												
Savannah.... 1852....	.....	.....	.....	....	8.721	9.310	5.324	5.040	4.673	....	.....	.....
" " 1853....	1.147	1.142	2.479	0.444	3.959	0.787	6.464	8.168	9.427	2.888	3.096	6.882
Jacksonville, 1853....	.....	.....	.....	0.465	1.530	3.240	7.400	2.700	9.675	9.350	2.275	3.618
Pensacola,...1852....	.....	.....	.....	.....	4.862	0.833	.....	14.000	0.500	.....	.....	.....
" " 1853....	3.250	4.062	2.562	0.500	0.200	0.937	2.531	1.562	14.781	5.500	1.000	1.969
MEAN PER CENTAGE OF HUMIDITY.												
Savannah,... 1852....	.....	.....	....	....	.740	.752	.787	.800	.818	.....	....	.....
" " 1853....	.658	.677	.690	.617	.690	.707	.773	.7	.793	.737	.770	.710
Jacksonville, 1853....	.....	.....	....	.....	.....	.826	.864	.840	.871	.....	....	.....

TABLE J.—*Mean Temperatures for* 1853 *in Districts in which Yellow Fever at same time prevailed—And a Comparison with a mean of years, or with the year* 1852.

		JUNE.	JULY.	AUG.	SEPT.	OCT.
Charleston,—Ft. Moultrie.......		78.48	82.85	80.08	76.83	65.69
....		+0.1	+1.5	—0.2	+0.7	—1.5
Savannah,.....................		79.00	81.50	79.33	75.83	64.50
....		—0.4	+0.2	—1.0	—1.1	—2.7
Whitemarsh Is'd,...............		77.40	80.92	78.65	74.85	63.74
....		+1.1	+1.8	—0.4	+1.0	—2.2
Jacksonville,..................		78.89	81.74	82.56	77.55	68.92
....	1852	80.00	82.92	82.37	76.47	71.59
Key West,......................		80.50	83.42	83.97	—	80.27
....		—1.4	—0.2	—0.6	—	+2.0
Ft. Brooke, Fla,...............		78.56	82.15	82.23	80.20	75.00
....		—0.8	—1.7	+2.0	+2.7	—0.9
Ft. Meade, Fla,................		75.53	79.00	78.20	79.93	73.01
....		—3.7	—0.8	—2.6	+2.0	+0.0
Cedar Keys,....................		80.11	83.18	81.98	79.37	71.94
....		+1.5	+2.7	+1.3	+0.6	—1.2
Pensacola,.....................		80.22	82.08	82.38	78.42	69.56
....		—0.4	—2.8	—1.1	—0.5	—1.5
New Orleans,...................		80.38	80.24	79.60	75.89	—
....		+2.2	—0.1	+0.0	—1.2	—
Austin,........................		80.81	82.00	81.01	76.77	66.65
....	1852	79.37	—	83.83	75.71	69.43
New Wied,......................		80.80	82.00	81.00	76.80	
....	1852	79.25	82.75	83.75	75.75	68.75
Fort Brown,....................		82.08	84.18	82.88	78.41	71.88
....		+0.4	+0.8	—1.8	—2.0	—2.1

TABLE K.

Weather at various Stations during the Yellow Fever months of 1853.

	JUNE.	JULY.	AUGUST.	SEPTEMBER.	OCTOBER.
Charleston, Fort Moultrie,	Dry	Last half showery	Very showery.	He'vy sho'ers.	Usual
Savannah,	Very dry	Showery	Very wet	1st half very wet	......
Jacksonville,	Dry	Very showery.	Usual	Very wet	......
Bermuda,	......	......	......	......	......
Key West,	Very wet	Showery	Showery	......	Dry
Fort Meade,	Showery	Very showery.	Showery	Showery	Frequnt showers
Fort Brooke,	Wet	Very showery.	Showery	First half showery	Few showers.
Cedar Keys,	Dry	Very showery.	Showery	1st half very wet	......
Pensacola,	Dry	Usual or dry	Usual or dry	1st half very wet	......
New Orleans,	Last half showry	Very wet	Very showery.	1st half very wet	......
Austin,	Usual	Dry ex. last five days	Humid, few showers	1st half wet, 2d do humid	......
San Antonio,	Usual	Dry	Usual	Usual	......
Fort Graham,	......	......	......	......	......
Fort Brown,	Dry	Very dry	1st half dry, 2d " wet	Constantly showery	Constantly showry

TABLE L.—*Amount of Rain at Stations at which Yellow Fever prevailed, for the Summer months of* 1853, *and in comparison with a mean of several years.*

	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Charleston, Ft. Moultrie	1.550	10.880	2.200	8.100	4.050		
	—2.8	+4.4	—5.0	+2.5	+1.5		
Savannah	0.787	6.464	8.168	9.427	2.888		
	—7.2	—3.2	—1.2	+4.9	—0.3		
Whitemarsh Island, Ga.	1.280	5.280	5.580	13.200	3.240		
	—3.0	+1.2	—0.2	+10.4	+2.1		
Cedar Keys	3.262	11.437	3.625	15.437	4.600		
	—1.9	+2.0	—4.0	+9.1	+1.2		
Key West	18.110	2.330	5.020		1.690		
	+14.6	+0.0	+1.7		—1.5		
Ft. Brooke, Fla.	9.090	4.120	4.670	4.360	1.700		
	+2.4	—7.0	—5.8	—3.9	—0.8		
Bermuda 1853			3.510		6.690	11.630	11.340
1852			7.000		4.260	2.400	2.980
Ft. Meade, Fla.	3.540	4.520	3.390	2.120	0.310		
Pensacola	0.937	2.531	1.562	14.781	5.500		
		—6.1	—7.1	+12.1	+2.0		
New Orleans	1.712	11.508	6.280	4.948			
	—3.7	+5.0	+0.8	+1.0			
Ft. Brown, Matomoras	1.700	0.000	3.100	8.000	7.750		
	—1.0	—1.8	+1.2	+3.3	+2.8		

TABLE M.

Humidity, or Fraction of Saturation at the Hours of Observation, and the Monthly Mean at Various Stations for the Summer of 1853.

	JUNE.				JULY.				AUGUST.				SEPTEMBER.				OCTOBER.			
	7	2	9	Mean	7	2	9	Mean	7	2	9	Mean	7	2	9	Mean	7	2	9	Mean
Richmond, Va.,	....	....	....	.597	....	....	....	.722	....	....	....	(R) 700	....	....	....	750	....	....	....	....
1852,	6 .741	2 .429	10 .743	.637	6 .851	2 .540	0 .823	.738	6 935	2 654	10 931	840	6 .948	2 547	10 .875	.790	....	....	....	....
Savannah, Ga,	.770	.550	800	707	.860	.630	830	773	900	.690	860	817	.890	.640	850	793	.830	580	800	.737
1852,	6 .857	2 .584	10 .806	732	6 .902	2 .615	10 .847	787	6 883	2 603	10 833	.800	6 .907	2 673	10 .868	.818	6 .879	2 541	0 829	750
Culloden, Ga.,	.710	423	.561	.565	.863	.591	762	736	.830	622	.784	745	845	....	802	.763	.817	587	731	.712
Eutaw, Ala,	.695	456	716	623	.815	626	885	775	871	688	950	.838	....	664	....	....	....	....	....	....
New Orleans,	.907	650	876	811	.895	.707	918	840	944	805	.907	.885	.930	.671	.910	.852	....	....	....	....
1852,	S. R. .938	3 .639	....	789	.951	.728	...	840	S. R. 910	3 677	....	.809	S. R .954	3 .676	....	815	....	....	....	....
Austin, Texas,	.723	446	.849	.673	.782	.550	.798	.710	814	501	.890	.735	840	525	.868	.744	....	....	....	....
1852,	S. R .899	3 .493	....	.696	S. R. .854	3 .448	....	651	S R. .832	3 380	....	656	S R .892	3 547	....	.720	....	....	....	....
Lebanon, Tenn,	.632	.373	622	.543	.699	.455	741	632	....	....	....	....	....	....	....	....	....	....	....	....
1852,	6 806	2 .438	10 .740	.662	6 .835	2 .419	10 692	648	6 862	2 556	10 774	719	6 858	2 527	10 .775	719	....	....	....	....
Glenwood, Tenn	.833	485	.735	.684	.857	566	786	703	910	651	.831	797	.922	664	.843	810	....	....	....	....
Knoxville, Tenn.,	.805	.471	.767	.681	....	....	...	....	....	....	....	....	....	....	....	....	....	....	....	....
1852,	6 .915	2 .545	10 866	.782	6 915	2 .563	10 847	774	6 927	2 .575	10 886	.799	6 912	2 .632	10 .873	806	....	....	....	....
Germantown, Ohio,	.760	.410	780	.650	.790	.480	770	.680	.898	566	888	.784	940	.640	.890	820	.926	.562	.841	.776
1852,	6 .907	1 .583	10 867	786	6 .893	2 .496	10 832	740	6 .910	2 530	10 830	.757	6 940	2 .604	10 .903	.816	....	....	....	....
New Harmony, Ia,	.660	.490	.750	.633	....	....	....	....	850	.590	.780	740	.880	.620	.860	.787	....	....	....	....
1852.	S. R 890	3 .570	....	.730	S. R. .890	3 .580	....	.735	S. R 900	3 630	....	.76$_5$	S R .900	3 .644	....	.772	....	....	....	....
Dubuque, Iowa,	.721	.496	.745	.654	.750	.501	780	.680	.780	520	800	.70$_0$	.790	.600	.800	.730	....	....	....	....
1852,	6 .770	2 .450	10 .760	.660	6 .820	2 .490	10 .810	.707	6 .824	2 .433	10 .779	.67^9	6 .820	2 .500	10 .780	.700	....	....	....	....

In comparison with 1852, and with previous years generally, the difference of hours must be taken into account. Sunrise and 6 A. M. always give a higher fraction of saturation than 7 A. M.; and the mean deducted from 6, 2, 10; and from sunrise and 3 P. M. it is always greater than that from 7, 2, 9. The precise measure of this correction has not been determined.

June, of 1853, was everywhere less humid than 1852, except at New Orleans; there its fraction of saturation was greater in 1853, distinguishing this point as reversing the condition common to most other parts of the country for that month.

July, of 1853, has a higher saturation at Austin, New Orleans, and Savannah; elsewhere less than in 1852.

In August, 1853, is everywhere of higher saturation than in previous years; and the difference is greatest at New Orleans.

September, 1853, presents the same conditions prevailing in August.

October is not sufficiently observed.

Such then, are some of the *direct* proofs furnished by meteorology, of the limits and extension of the great epidemic. It is only to be regretted that every village and hamlet in the country does not supply data of a similar character, to make the application still more precise. On a critical analysis of these highly valuable observations, it will be seen with what exact accordance they correspond with the variable outbreak of the epidemic in every part of this extended region. *In every instance where the facts are known great heat and high saturation* were the predominant conditions for the prevalence of the disease, and it was often remarked that "the *return of these conditions re-produced the fever two or three times.*" Can proof be made stronger? It will be thus seen how truthfully and philosophically this explanation comes in to substitute itself for that most unsatisfactory and barbarous one of contagion, sundering, so far as it extends its creed, every tie that binds man to man, as we have unfortunately found to be the *case* in many instances during the last season in the interior, not in this city, where the doctrine is entirely new. The inhumanity of that attribution is only equaled by its folly. If yellow fever is contagious, *it is a law of the disease,* this it must carry into all places, and under all circumstances (like small pox.) A "*contingent contagion*" is a medical misnomer, is void of a precedent, and has no parallel in the annals of the science. Every device has been resorted to in the way of experiment to show the contagious quality of yellow fever, if any existed, but have all signally failed. That it may be *infectious* under certain circumstances, is admitting nothing more than that it is caused by *impure air*, and that this air can be carried in the hold of a vessel, or any similar mode, by which the air of one place is conveyed to another, or even through clothing, (in some special cases and to a very limited extent,) is not denied. Where the above conditions are present in a sickly season or district, it sometimes requires but a slight addition for the development of the disease, and this is apparently furnished occasionally, by the arrival of cases, or vessels, or goods,

Great heat and high saturation always present

Why impossible to be contagious.

To what extent infectious

with the poisonous or infectious air; but it is not a result of *secretory* action, as all the contagions unquestionably are. This susceptibility of conveyance or transportability, exists, to a very limited extent, and only when the causes giving origin to the disease are more than usually malignant, and are *only propagated in a kindred or congenial atmosphere.* These views have thousands of times been proved by our constant experience here for more than half a century, and such, I deem it, is the general result of the experience of the profession South, during that long period, with a very few exceptions, and those mostly of the last year.

Infection not personal.

Infection is not a personal quality—it applies to vitiated air from whatever cause proceeding. It is the product, not the producer. It is the *rem.* How is it when we approach so near as to causation—to the thing—the principle—in any of the generally acknowledged contagious diseases? In small pox the smallest appreciable amount of *secreted matter* inserted into the body, at *once* and *always* produces the disease, and all these contagions have a *peculiar secretion* as a *product of the disease*, which by its specific action on the system, re-produces itself and thus propagates the malady. Is that the case in yellow fever? *All the secretions and products of the disease* have been over and over again inoculated into susceptible bodies. Even black vomit itself has been tried in every way, and all with impunity. They have been slept with, clothes used, all with the same result, and this would ever be the case, unless there should happen to be *present an epidemic, or foul, or kindred atmosphere!* Without then, this *localising condition*, the congenial materials, the disease does not spread. If it is not contagious, and it has never been found *apparently* so in this country before, then there are existing independent circumstances that account even for the *seemingly* contagious quality, and this proves the existence of the epidemic atmosphere or epidemic meteoration, and the extensive prevalence of yellow fever out of its usual bounds *is proof positive of the existence of that epidemic atmosphere*, and its prevalence and limits are bounded by it.

What is contagion.

Yellow fever not contagious.

How apparently so, explained.

Such high authorities as Drs. Haygarth, Percival, Ferrier

Carmichael Smith, Currie, Russell, Roberts, Arnott, Christison, and others in England, deny that exhalations from the living body are capable of permanent suspension in the atmosphere, or that they can be conveyed, unchanged, through pure air to great distances. They regard it as established by an indubitable body of evidence, that the moment these exhalations come in contact with the external atmosphere, they are diffused through it; that by such diffusion, their infectious properties are destroyed, and that, though when pent up in close unventilated rooms or filthy ships they may acquire some degree of permanence, much concentration and virulence, yet, when they once pass into the ocean of air, they disappear as a drop of rain in the ocean of water. These authorities, view the property thus possessed by air to neutralize and destroy these exhalations, as a provision of nature for our well-being.

No exhalation from human bodies of permanent suspension in the atmosphere.

It was further observed that if the emanations thrown off from the living body formed permanent and powerful poisons, and if this were capable of being conveyed, unchanged, to great distances, we should be able to live only in solitude; we could not meet in society, for we should poison each other; the first symptom of illness would be the signal for the abandonment of the sick, and we should be compelled by a due regard to self preservation, to withhold from persons afflicted with disease, every degree of assistance that required personal attendance.

Consequences on human intercourse, if permanent.

Forbid human intercourse.

But our physical is in harmony with our social constitution, and not in contradiction to it. The necessity of intercourse between all the members of the human family is one of the moral exigences of our race. The policy of encouraging, facilitating and fostering that intercourse among all the nations of the earth is one of the impressive distinctions of our age. "But if it be true that plague and pestilence are capable of being imported from country to country, carrying devastation in their course, and that this calamity may be prevented and can only be prevented by placing periodical barriers between one nation and another, so as effectually to obstruct that intercourse, then there is a contradiction between the necessities and obligations of the human family, and the physical laws of their being.*"

Physical in harmony with social constitution.

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* Report on Quarantine—General Board of Health.

It is as true in physic as in other sciences, that "there are more *false facts* than *false theories*," and the alarm in the public mind, last year, was sufficient and did clothe this disease with qualities susceptible of explanation, much more satisfactory, of universal application, and in exact accordance with reason, science and philanthropy. There can be no two opposite facts in nature, although it may be very difficult sometimes to ascertain and establish the true one. Whenever this difficulty occurs we must apply to general principles for explanation, and have recourse to the ordinary and well known causes, circumstances, condition, and analogies, existing or applicable.

No two opposite facts in nature.

Another ground of error existed in confounding an *epidemic* with an *endemic*. The difference does not exist merely in a greater prevalence over a wider space of the former, but in a *greater intensity* of the *materies morbi*. An epidemic is a wide pervading disease, one of whose constituents being atmospheric, and therefore diffusive, influences the type of prevailing febrile maladies, and furnishes to them *a uniformity of livery*, and this will doubtless aid in the explanation why so many creoles have been affected with a fever, having so many of the characteristics of the yellow fever last year, and especially with children, who are so much more susceptible to prevailing maladies than adults. During the existence of an *endemic fever*, this does not take place, although equally and similarly exposed. The very idea of transporting *an epidemic*, which is mainly atmospherical, from one country or locality to another, is an absurdity upon its face. The very statement of the proposition, is its own refutation with intelligent and thinking men. It is little less than arrogating an attribute of omnipotence.

Difference between an epidemic and an endemic.

What is an epidemic.

The important practical deduction resulting from this, is, that *an epidemic cannot be imported.* The principle is very clear. The facts are in exact accordance. Humboldt has long since shown, that, although yellow fever prevailed among the newly arrived *every year* at Vera Cruz, it never prevailed *epidemically* there between 1776 and 1794, although the intercourse with Havana and other places, where the disease continued to pre-

Practical deduction.

Proof from Humboldt.

vail, was quite free. If a case of yellow fever proceeding from a locality where the epidemic prevails is conveyed to another, where it does not, it must terminate with the case, as has been eminently illustrated this last year, on the various marginal limits of the epidemic. This proof of epidemic influence is shown by pointing out these limits, and here it is known mainly by its wanting those evidences of its existence which proved its presence in others. Professor Blodget's interesting communication has shown, that the principal atmospherical constituents consisted in a *high saturation*, with *elevated temperature.* Now, in these places where this epidemic showed itself, and not *having the power of spreading*, there is no evidence to show that these existed, *or only one* existed. For instance, at *Memphis*, about two hundred miles above Napoleon, Arkansas, many cases, (upwards of sixty,) were carried, but with the freest intercourse, public as well as private, the disease did not spread. The place was far from clean, but there is no proof either of high saturation or elevated temperature.

No where even apparently contagious but where the epidemic principle was present.

As at Memphis.

At *Bladon Springs, Ala.*, where the sick were taken in considerable numbers, and there existed the most unlimited communication with all, yet it did not spread, and there was exhibited no evidence of the two conditions required, or either of them.

As at Bladen Springs.

At *Clinton*, near Vicksburg, the same thing happened; there was the most uninterrupted intercourse with "infected spots," persons, and goods, but there was no evidence of an epidemic atmosphere, and consequently the disease did not spread.

At Clinton.

At *Cahawba, Ala.*, about ten miles from Selma, where it prevailed in an eminent degree, and between which places there was constant uninterrupted intercourse, the disease, although freely brought there, did not spread, but terminated with the individual cases. There existed nothing unusual in the seasons.

At Cahawba.

At *Black River*, Concordia Parish, many cases of yellow fever were carried, but it did not spread. Precisely the same occurred at Waterproof, Tensas Parish, where many cases were brought and terminated without extending the disease. A like result was noted at *Point Clair*, at *Holly Wood* and at *Gaines-*

At Black River, Pt. Clair, Holly Wood, and Gainesville.

ville, and many other places, including our watering places, until an advanced period of the season, when, from the occurrence of the precedingly mentioned conditions, the disease became developed.

Proof at Trinity, La.

At *Trinity, La.*, a rather remarkable instance was furnished *of both conditions being required for effect*, for saw-dust was used to fill up low places in the streets, and even the earth dug from a foundation for a warehouse, was spread upon the streets; but there was no evidence of the existence of *the other condition*, extreme heat, direct (radiation) or indirect, or proof of unusual moisture by hygrometric tests. On the contrary, no epidemic influence noted on the fruit, "which were fine and healthy; musquetoes not so troublesome as usual; mould less than common," (proof of dry air;) no disease or fatality observed among animals." "Many cases of fever brought here, and ended without propagation, and no precaution used."*

At Portersville, cases not extend.

At *Portersville*, where several hundred people were assembled, and about one hundred and fifty in one inclosure, no cases occurred, although five imported cases were brought in, nursed by different persons, and two died with black vomit. The disease did not extend.†

In Rio.

Puerto Cabello.

Gayaquil.

During the existence of the epidemic yellow fever at Rio, many persons were carried to towns at some leagues distance, but in no case did it spread. The same thing occurred in the neighborhood of Puerto Cabello, and Guayaquil. The *epidemic atmosphere* did not extend to them, and consequently the other condition was wanting.

This description of cases, circumstances, and results, could be indefinitely multiplied, not only this year, but every year of the existence of yellow fever, either here or in foreign countries.

The cause of non-communication or extension.

The explanation is so obvious, on the principles to be presently laid down in this Report, that it is scarcely necessary to anticipate them here. One of the conditions deemed essential for the existence of an *epidemic* disease is wanting; either the terrene or meteorological. The cases above given, show that the epidemic atmosphere was not present, and the disease did not spread. Again, a sudden change in the weather occurs, the yellow fever is arrested; multitudes of fresh unacclimated people (as we have often witnessed) rush into the city, and become exposed to the very foci where it was lately so malignant, yet not a case occurs. *The meteorological condition is wanting.* But, if the weather again becomes hot and moist, with high radiation, the disease is certain to become resuscitated. Again, the cause why *cholera* passes over one town or plantation and seizes on the next, is evidently owing, according to the most satisfactory experience in England, and what has been known to follow the disease here since 1832, in the difference in the terrene or localising conditions, (filth, disturbance of soil, &c.,) and the atmospherical being, or not, *in unison.*

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* From our intelligent communicant, Dr. Kilpatrick.

† Dr. Moore.

Fever the same as in former years.

It was also alleged that the fever of 1853 was different from any fever with which this city had been inflicted heretofore, and *therefore* must have been "imported" from the West Indies, Rio Janeiro, Africa, "Nova Zembla," or God knows where. This has proceeded from a patriotic, but mistaken impulse, which is pretty universal, as well among savages, as those more civilized, viz: *never to acknowledge the paternity of a pestilence!* Nevertheless, the sober dictates of truth, still more unyielding and inflexible than those feelings, compels the acknowledgement, painful as it is, that the late epidemic first commenced in this city. I have shown the folly of ascribing its origin to any foreign source, and that the appearance and symptoms of the fever, did not run precisely parallel with the yellow fever of every year, is just what might have been expected. No practical man will say he ever met with them, precisely similar in type and symptoms, at every point, in any series of consecutive years. There has been left some chasm in the similitude, some inequality in the morbid excitement. At one season, the head will be the more prominent point of attack, or onus of the disease; at another, the stomach; at another the spinal system, &c., &c., giving rise to different theories

Each have their types.

as to the pathology of the disease, requiring a modification of treatment; now blood-letting, to a great extent, general as well as local, as in the epidemic of 1833, requiring only local in that of 1839, bearing neither in that of 1841; not admitting the general, and requiring much discrimination in the local detraction of blood, last year, (in my judgment,) and in all very little medicine. These peculiarities are probably produced by variations in the remote cause, and the different conditions of the individual. Such is just the experience in other American cities. I think it is less so in the West Indies, from the greater uniformity of climate and condition there. Such, too, is the result of the experience in other diseases.

Although an epidemic atmosphere may prevail, disease only developed where localising conditions of filth, &c.

All epidemics, as all other diseases, must have a beginning, a starting point. That point will be in whatever part of a city or country, in which the localising causes shall exist in the greatest excess, (as will be hereafter pointed out.) This has been clearly demonstrated, by an examination into this subject in England, where it has been made evident that while an epidemic state of the atmosphere exists over the whole country, the *disease will only be developed where* there exists *also*, in more or less *intensity*, the *localising conditions* of *filth*, moisture, stagnant air, &c., (to constitute the perfect combination.) The result of the investigations of the Sanitary Commission has, most strongly corroborated these valuable facts, and in almost every place, which they were enabled to examine personally, the causes for the localization were made apparent enough, and will be mentioned hereafter. Could this Commission have been enabled to carry out the examinations they intended, the public would have been put in possession of a still larger body of most valuable facts, to form the basis of future legislation, in this most important sanitary movement.

SECTION VI.

Two agents essential to produce an epidemic—Atmospheric and Terrene—Climate what? How far heat is productive of yellow fever—Regular progress of from the South—Yellow fever zone—Limits of the epidemic of 1853—*On what dependent—Geographical limits of fever—Humidity important element in climate—Quantity of rain not sufficient evidence of it—Error of Darby in relation to the dryness of this climate—Moisture essential to yellow fever—The great causes of our moisture—Radiation—"Yellow fever weather"—Radiation of different climates—Winds—Amount of moisture in each at New Orleans.*

Having already shown proofs of the general fact of the existence of the epidemic, of its influencing the animal and vegetable kingdoms, of its extension by atmospheric and other conditions, and of the practical fact of the *impossibility of its importation*, I now proceed in more detail to specify, if not the precise elements of which it was composed, what will answer just as well for all practical purposes, the *conditions necessary for its existence*, and, fortunately for us, they can be measurably, if not entirely controlled.

Pestilences have, even to this day, been considered one of the mysteries of nature; and viewing a disease as an epidemic was deemed a sufficient answer to all inquiries in relation to its cause or nature. This does not satisfy the exactions of modern science any more than it does of the causes of tempests, storms, earthquakes, famine, and other instruments of destruction to mankind. As men were unacquainted with their causes or laws, they were denominated "accidental," although, all intelligent men now know that there can be no such thing as "chance" in the government of the world, but that there must be causes and laws of action, if we could only find them out, which is both our duty and interest. In the following pages we have attempted to analyze the METEOROLOGICAL constituents, as far as our means extended; and as it was clearly evident that these alone were not sufficient, other causes were sought out, and it was soon clearly apparent, from the facts before us, from long

Ancient opinion of pestilences.

Must be causes and under laws.

experience, from analogy, and from the records of history, that filth, impurities of all kinds, disturbances of the soil, all combined in what I have denominated TERRENE, formed an essential and indispensable link in constituting a pestilential or epidemic atmosphere.

Epidemics "shears of fate."

EPIDEMICS have been denominated the "shears of fate," the singular propriety of which I will demonstrate by interpreting one blade to consist of the *meteorological condition* and the other the *terrene, or local vitiations* to give it life, impart intensity, and produce development. Both are indispensable for efficiency. Hence then, the very natural division into

1st. Meteorological; and

2d. Terrene;

neither of which alone is competent to the production of yellow fever; the first is not a simple but compound condition, as we shall see hereafter. The second may be also. I do not propose to examine into it in this Report.

The danger is in their combination.

It is the COMBINATION of these necessary ingredients that constitutes the danger, that forms the poison and produces the element of destruction. Let us consider these separately, analyze them, see what power we have over them, so as to prevent that union which is so fatal.

The meteorology is the climate of a country.

First, of the METEOROLOGICAL: the meteorology of a city, district or country, may, without any great violence to truth, be denominated the climate of that city, &c. Its climate determines the character of its diseases, from its influence on the great law of causation, and with reference to the great principle of prevention, that is, sanitary measures, it is almost equally important. The very idea of attempting to influence these without a knowledge of its great principles to pilot and to guide us, is but groping like the blind Cyclops in the dark. This is so well understood by every scientific as well as unscientific man, that there is no description of any epidemic fever on record, of any note, in which there is not constant reference to the condition and changes of the weather as producing or influencing the disease. The testimony is overwhelming; in no postulate in medicine is there less dispute; all practical men yield it their prompt credence.

Temperature has been very properly supposed to have much to do in the production of yellow fever, and that the yellow fever zone proper, is restricted to limits where the temperature at midday, during the months of June and July is not less than 79°, and that the extent and malignancy of the disease is often in proportion to the extent in which it shall exceed that height where the other causes concur in a similar degree. That has been applied to the region as far North as Philadelphia very successfully, even during the last summer. It will not apply here with the same exactitude, because our temperature at midday is always above that point at that hour from the month of May to the month of September, nor is the malignancy of the disease in the proportion that it shall exceed that height here. The average temperature at midday of May and June preceding our epidemics has rarely been 81°88, and during the three epidemic months at the same period 83°75. The average temperature of the whole day for the three months has been 79°51. It rarely reaches as high a degree as 90° during the hottest parts of the day. M. Arejula, a Spanish physician and writer of eminence, says that under 23° Reaumur (82 Fahrenheit) it does not appear in Spain (I think.) In Rio de Janeiro it appears when the thermometer is at 77°. It is not a disease requiring the highest temperature for its development; indeed, I conceive this (or above 90°) rather unfavorable to its origination. The accompaniment of great humidity being essential, and with precipitation the temperature at once falls. The average tropical temperature of 80° of considerable duration, with great humidity, is doubtless essential to its elimination here and South of us. In Africa and the East Indies, a much higher temperature and higher combination may be the cause of its non-existence among them. So, on the contrary, a temperature above 80° is fatal to the plague! And thus, also, a temperature from 30° to 50° develops (with other circumstances, as in the other instances) the typhus gravior. Below this *fever* does not occur at all. Such are the meteorolog-

High temperature of certain duration essential.

In Philadelphia.

Temperature preceding an epidemic at New Orleans, and during it.

In Spain.

At Rio.

Above 90 deg. too high to favor its production.

Hence it does not exist in Africa and East Indies.

Temperature required for the plague.

Do. for typhus gravior.

ical limits of these great types of disease; the distinguishing characteristics of different climates and distant countries; the avenue through which one-sixth (it is computed) of those who annually fall victims to disease reach the shores of time.

Temperature alone not sufficient.

From these remarks on the influence of temperature in the production of yellow fever, it is not at all attempted to support an opinion, which, no one who has investigated the subject, believes, that elevated temperature *alone* produces it, for were that the case, it would appear annually in regions far North of us, where it is for long lapses of time an entire stranger; for we know, that extremes of summer temperature, so far from declining in proportion to increase of latitude, is just the reverse (for a certain time) and that our *extreme heat* here, is rarely equal to what it is very far North of us. Temperature, then, is only *one* of the elementary agents to aid in giving birth and activity to our formidable foe. The same may be said in relation to its decline or extinction. As it commences usually South of us, (in the West Indies, South America and Mexico,) on an average (one year with another) at least two months in advance or about May, so it retires that much earlier, and being a fever whose ordinary duration is from sixty to ninety days, usually terminates, when with us, it is at its maximum intensity. The same principle will apply with more or less accuracy, to the regions North of us. Temperature then, although a certain range and *duration*, is absolutely necessary for its origin, is not indispensable (or has little to do) for its continuance, far South of us it becomes extinct while this high range continues—ceases here usually before frost, (the supposed great extinguisher,) or continues sometime after its occurrence, and particularly has this been the case last year and more especially in several parts of the Southwestern States.

Yellow fever commences regularly from South, and proceeds regularly North.

Limits of epidemic in 1853.

The farthest North the epidemic atmosphere extended the last season has been at Napoleon, Arkansas, about 33° 50' North, and from Tampa in Florida, to Brownsville in Texas, in latitude 25.50. The yellow fever zone, so often varying, now extends from Rio Janeiro to Charleston, and from Barbadoes to Vera

Cruz. Commencing at Rio, in January, it proceeds after reaching its acme, gradually North, reaching the Northern coast of South America, in April and May, and the West Indies and Vera Cruz, in May and June, it arrives here usually the latter part of July, and does not usually reach its Northern limit until some time in August and September. In this mere historical statement, of course, it is not intended to be implied that the yellow fever is imported from the South to the North, in this regular gradation, but merely that the physical changes inviting and producing its development becomes evolved as the season advances.

Periods of its appearance in different countries.

Among these changes it is not intended to be understood that its prevalence is in proportion to the temperature existing; there are other circumstances that influence its production, among the most prominent of which, in the deadly combination, is the presence of high saturation. This is amply and beautifully illustrated in Prof. Blodget's interesting communication in another page—where high temperature long existed with entire salubrity, but as soon as great humidity was superadded, the fever was at once developed. It is difficult to say, why this two-fold combination should be essential, but in all climatural and endemic fevers, and this is essentially one, this double constituency is a *sine qua non.* This then is another proof that removes it from the category of contagious maladies, which are entirely independent of such contingencies.

Another disproof of contagion.

The zone, as now existing, is different from what it was formerly, although the temperature is about the same, the localising conditions so much under the control of sanitary measures, have, no doubt, influenced it much. Climate (that is, its power of affecting our race) is very much under the influence of circumstances, heat, moisture, dryness, its main ingredients, can be much altered (as we shall see by-and-bye,) our mode of living also influences it. If then, we can influence healthy actions, I know no reason why morbid actions should not also be influenced. In fact, we know that they may be, for I myself have remarked it, in the various changes this country has undergone,

On what the yellow fever zone depends, mainly.

during my long residence in it. It is as important as interesting to us, to know *why* the yellow fever should prevail in Brazil for the first time in 1849–'50. It has heretofore been the healthiest tropical city in the world, and now we hear of its first advent in Chili and Peru, (March, 1854,) and in Guayaquil in 1853; nor has cholera in all its destructive diffusiveness ever been known to have overstepped the equator.

The limits within which yellow fever may occur spontaneously, (the yellow fever zone proper) is a subject of deep interest to us, and the more so, if this can be influenced, and averted as I believe it can, by the power of man. In the latter period of the last century, and the earlier decades of this, it was common, almost annually, in some cities, as far North as latitude 40°. The ground is now assumed, and will be hereafter supported in this report, that the immunity now enjoyed by them, has resulted from no change of climate, or in the constitution of the inhabitants, (technically considered,) but has *arisen from the application and enforcement of sanitary laws and regulations.* My own opinion has been long since given,* that yellow fever is gradually blending itself here with the ordinary diseases of the climate and season. Even during last year, many cases (at least a dozen) in my own practice, during the raging of the epidemic, where the distinction and unequivocal symptoms of yellow fever could not be mistaken, and where this exact type occurred in the same individuals in a former year, during the prevalence of yellow fever. The bilious autumnal fevers of this country not unfrequently put on the yellow fever type (hæmorrhage, yellowness, black vomit) when the causes productive of these are much concentrated, that is, when the two conditions exist in a high degree; the same occurs in the *tierras calientes* (the low level region) of Mexico and some of the rural districts of South America—as near Guayaquil, and in the West Indias, as at Barbadoes, where they suffered nearly as much, as in the towns, and where the negroes suffered, for the first time from it; and epidemics of yellow fever, occasionally sweep through those countries, as it has

What has changed it.

Yellow fever blending with the ordinary fevers of the country.

Occurs in the marshy districts of Mexico, South America, and West Indies.

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*Report to State Medical Society.

through this, last year, showing most conclusively, that when the causes which give rise to yellow fever, exist in an exaggerated degree, an epidemic is the result, whether in town or country, and that a sufficient amount can be accumulated to produce an *endemic* fever in a locality far removed from the ordinary yellow fever region, we well know, from what has occurred at Gallipolis, in Ohio, in 1796, and at Fort Smith, Arkansas, in 1823, if not in Louisville, in 1822.

Precursors of the yellow fever at Rio.

These changes of the types of disease, is no more remarkable than that different countries should be subject to different maladies. For three or four years preceding the first occurrence of an epidemic yellow fever in Rio, in the winter of 1849–'50, there had been a gradual change in the types of fever of that country, with an occasional case of unequivocal yellow fever (as recognized by those who had been familiar with it,) until its final development into a disastrous epidemic. Coincident and cotemporaneous with this great change in the diseases of the country, were proofs "that the broad features of the climate of Brazil had altered strangely, old residents declaring that the seasons were no longer such as they remember them to have been,"* all acknowledged an unusual state of the atmosphere existed, a remarkable absence of the usual thunder storms, which were daily, at a certain hour, during the summer season, a prevalence of winds from an unusual quarter, (the Northeast) besides other unknown but acknowledged changes. These less tangible variations have not been noted, or observed, nor do we yet know of the presence there of a faithful notary of science, to record those important conditions that instrumental observation can alone render valuable.

Simultaneous climatic changes.

Another impressive instance of the effects of climatic changes in the production of disease is furnished by Dr. Blair in his recent valuable work on the yellow fever of Demarara. Here, as in Brazil, it was noted that whenever the diseases varied or changed, they were usually preceded by some variation in the *climatic condition.* Thus in Demarara preceding the long

Diseases change with the climate.

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*Dr. Pennell.

continued epidemic beginning in 1837, it was noted and even the "planters observed that the climate had changed. The date of the commencement and termination of the two rainy seasons cannot now be ascertained or prognosticated with the same precision as formerly. Land winds prevail in the rainy season, during night and morning only," &c.* Such, too, is the result of experience in all countries—such is reasonable where meteorology is well understood, and records are made; and every where, of the variations in the climatic condition; there the results arising from them (*disease*) can be anticipated and if we shall be unable to prevent, provision will be made for them, and their influence modified and curtailed.

Demarara.

Dr. Blair notices that "extreme seasons not only always modify the type of disease, but the effects of treatment; during the depths of the rainy season, adynamic and congestive types are prevalent and marked; purgatives now do harm; mercury too easily salivates; thirst is diminished. There is increased action of the kidneys, there are local congestions, headaches, drowsiness, sopor coma, watery stools." These effects I have constantly noticed in this climate for many years.

Do. modifies and influences treatment.

That the laws of vital action are influenced by meteorological conditions, surely we are not now to learn for the first time. Man learned it when he was first exposed to an inclement and variable sky, and has ever since used protectives against it. The foes of our race, it is very true, are not confined to these, but in the hasty generalizations of later periods these have been almost entirely overlooked, and the morbific materials have been almost solely attributed to agents that allow a more extensive speculation, and that furnish the data for a more prurient imagination. It is the duty of philosophy to curb this dangerous propensity, to confine ourselves, as much as possible, within strict limits, and allow due justice to all

Vital laws influenced by meteorological.

From *Guayaquil*, lat. 2° 15′ S., the Sanitary Commission has received the *first recorded evidence known*, of the yellow fever having appeared South of the Equator, (previous to 1849,

First yellow fever South of the equator.

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*Dr. Blair.

–'50.) Dr. Wm. Jamison writes us, through the American Consul, of its having occurred there in 1740, and again in 1842. In the latter year it was fatal to twelve per cent. of the population. At Augas, 3,028 feet above the level of the sea, many died of the fever contracted on the banks of the river Guayaquil, but in no case was it communicated to the inhabitants.

And at unusual height of 3,018 feet, in rural districts.

Dr. Lacomb writes us from *Puerto Cabello*, through the United States Consul: "We have instances of black vomit occurring constantly in different parts of the interior of this country; lately, at Nutrias, nearly sixty per cent. of the population died of it. Also, at the Aragua Valley, in Valencia, the capital of the province, situated nine leagues from this place, many cases occurred among the creole population; especially young people. In Caraccas, five leagues from Laguayra, many cases were fatal among the creole population."

Do. in rural districts and with natives.

In *Barbadoes*, although clearly and palpably originating there from local causes, it soon spread over the entire Island, and was just as bad in the rural districts as in the town.*

Do. in Barbadoes.

Many instances were mentioned and will be found in our record, of *repetition of attack*, and the liability of those born here, (and not of creole parents, and some that were, and grown,) were very numerous, more so than has ever been noticed before, even reaching the limits of adult life, and the dread of yellow fever began to be brought home, and even experienced, by the fully developed natives. This has been attributed, during the fever, to the uncommon malignity of the disease. May be the opinion I have heretofore advanced is the true one, and I repeat, although in vivid recollection of the scenes of last year, that the clear and unequivocal type is not so distinctly manifested in the *mass of cases*, as it was twenty or thirty years ago. A hope is entertained in Charleston, that from the liability to attack of the more advanced adults, and in proportion to this retardation of age, there "exists the strongest possible proof that our circumstances are undergoing a change of a nature calculated to sustain the opinion, that yellow fever is gradually ceasing to be an en-

Deductions from its blending with the ordinary fevers, not only here, but in Charleston.

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* From Dr. Sinclair, through the U. S. Consul, to the Sanitary Commission.

demic or climatic disease among us." If this is true, I know no reason why it may not apply, also, here. The hypothesis is an interesting and important one. It is very certain, that the liability to attack a second or third time, or even oftener, occurred in Philadelphia and other Northern cities frequently, and was the forerunner of its entire departure from among them; whether as the consequence of this change, we shall not undertake to determine. I am of opinion, that in former years, *this was not the case with us;* that in latter years it has become more common, and that the fever is becoming *more and more indistinguishable from the ordinary fevers of the season and country.* If with this we can lodge the hope of its departing from among us, or that the yellow fever zone is being removed further South, then, I am very willing to entertain it; but, I wish it distinctly understood as my conviction, that this change of zone, when once established, (and man must have created it by making the localising conditions,) is determined from the exercise of man's intelligence *in controlling the specific conditions upon which yellow fever depends,* (upon which we shall dwell hereafter,) and not upon any spontaneous climatic change, or evidence of cycles occurring, without some efficient cause.—These views are not at all incompatible with preceding observations, in which climatic changes in Brazil and Demarara preceded the outbreak of yellow fever there. Climatic conditions are the predisponent, but without the localising circumstances, (the second blade or "terrene,") as we shall see when we come to state them, yellow fever can no more occur than it can in a country without subjects.

This occurs thro' man's agency.

Occurrence of fever dependent on temperature.

Without some considerable elevation of atmospheric temperature, periodical or autumnal fever does not occur at all. When it occurs in cold and even in temperate climates, it is only during the hot weather, or towards the middle of summer; that a summer temperature of 60° is necessary for the production of the disease, and that it will not prevail as an *epidemic,* where the temperature of the season falls below sixty-five degrees, and disappears on the succession of frost.* Dr. Drake, in his great work upon the Diseases of the Mississippi Valley, remarks that the geographical limits of fever in this country, are East the Apalacian Mountains, below the 33d° of North latitude, beyond which these mountains do not extend. Below that parallel it has no Eastern limit but the Atlantic Ocean. Southwest of the Cordilleras of Mexico, and the Southern Rocky Mountains, constitute its boundaries. I have found in the City of Mexico, (situated near eight thousand feet above the level of the sea,) continued and intermittent fevers to constitute more than a sixth part of the annual mortality. In higher latitudes, it ceases in the great plains of our Western desert, long before we reach the mountains. It is almost unknown, says he, at the distance of three hundred miles from the Western boundary of the States of Missouri and Iowa, above the latitude of 37° North. In the South it does not prevail as an *epidemic* beyond the parallel of 44°, and ceases to occur periodically about 47°. The actual temperature here, last year, is shown with great particularity in tables B, C, D, T, and K. I trust there is no room for skepticism, then, to doubt the power of temperature in the production of fever, and there is as little doubt it is as much influenced by the hygrometer as the thermometer.

Its geographical limits.

Humidity is certainly the greatest when connected with a high temperature, and is most influential in the production of fever. This is exhibited in table H—showing the different mortalities of the same people, in the healthy country of Holland and Belgium, where the average annual temperature is less than 50°, and here, where it is upwards of 67°, with an average dew point of less than 43°, and here where it is near 62°, and with an average "temperature of evaporation" of less than 47°, and here where it is 64°.

Humidity affects health differently in different temperatures.

The mode of determining the amount of humidity is the most important, as it is the most recent point gained in the cultivation of meteorology, and the study of climate influ-

Its amount in the atmosphere recently understood.

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* La Roche.

ences on our race. One most interesting fact has been developed, which may be considered the key-stone of the great value of this mode of investigation, viz: Under the same temperature two sections of country will enjoy a different climate and salubrity, from different *hygrometric conditions.* One will exhibit a high saturation, producing a relaxed vital system, with energies more or less crippled, and extremely destructive to health and life. The other, where the hygrometer is lower, presenting a drier atmosphere, producing a greater elasticity of body and mind, with a power of endurance to which the other is a stranger, and with a continued enjoyment of health. In corroboration of this, the testimony is very ample. Humboldt mentions that "Cumana is the hottest, driest, and healthiest among the equinoctial towns of South America." In various parts of our own country, and even in this city, the fact of the coincidence of a great degree of dryness and health is abundantly shown, and so it is in various parts of Africa and the West Indies, and it is not *until the rains occur that fevers break out.*

Fevers not in proportion to amount of moisture, but a large proportion always required

Let it be distinctly understood, also, that fevers do not prevail *in proportion* to the height of the dew point, or amount of moisture *alone*, but that they *do not prevail without a high dew point*—that is, that a large amount of moisture with a high degree of heat, is essential to the evolution or development of the high grades of fever. Our second condition to constitute "the shears" complete, is equally required for destructive effect. Moisture, no doubt, is the controlling sanitary condition *at all high temperatures.* The distinction is very important. In a preceding section, on the "cost of acclimation for different nativities," the different effects are beautifully and satisfactorily shown on the same people emigrating from a country of great humidity and low temperature (Holland and Belgium) to one of high saturation and elevated temperature. These important facts were eminently illustrated last year. With an extreme of temperature in parts of the Southwest, there continued general health, *un-*

Different effects of humidity at high and low temperatures.

Proofs.

til humidity was added to it. Thus the devastation was extreme. The invaluable testimony upon this subject given by Professor Blodget, through the vast means, the net work of scientific climatology which the Smithsonian Institute is spreading over our own county, is incalculable. The excessive heats of Lower Texas, the Rio Grande valley, and other districts where the thermometer rises to 112°, 115°, have a *temperature of evaporation* not above that of New Orleans, with the air at 87°. At Austin, Texas, with the air at 98°, several times in June the temperature of evaporation never rose above 78°, and at the highest air temperature was at 74°, 76°, or nearly ten degrees below the temperature of evaporation at New York, where the air thermometer did not exceed 95°. The heats of these districts are therefore endurable, and even pleasant, at a degree which would seem fatal to life, from the great evaporating power and elasticity of the atmosphere, which uniformly prevails.*

Quantity of rain not exactly a proof of amount of moisture.

Nor is the quantity of rain that falls in a country the best evidence of this condition. A retentive soil, flat country, extensive marshes, and large bodies of water will furnish the facilities, with a high temperature, for a great and dangerous humidity; while a rocky, clayey, sandy or absorbent soil, and considerable declivity, will rapidly accelerate with winds from drying quarters, the removal of the rain that falls. Hence, the annual precipitation is not the best test of the humidity of a country.

Rainy season the sickly season.

The sickly season of nearly all countries, is the rainy season, and where there is an exception to it, it almost surely exhibits a marshy, that is, a partially dried swamp, which is more favorable to the accumulation of moisture in the atmosphere than when entirely inundated. This is very clearly exemplified by the occurrences at Tampico, in 1836. The rains usually commence there in July, and are followed by intense heat. This is the period of the yellow fever.

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* Letter from Prof. Blodget to me.

In the above-mentioned year the rainy season commenced two months later than usual, and there was a corresponding delay in the appearance of the disease.*

Proof at Puerto Cabello.

At *Puerto Cabello,* Dr. Lacomb states that "it is a constant and general rule that the place becomes entirely free from disease, and the healthiest in the world when *strong heat, combined with total absence of rain and dampness* prevails, the atmosphere then being entirely dry." On the contrary, "during the two last years, 1852–'53, the weather was very hot, and *very damp*, with frequent small rains; during all this period yellow fever prevailed."

Do. at Bermuda.

In the Island of *Bermuda*, a proverbially healthy place, there has occurred during the last summer, that precise combination of "unusually heavy rains, and scorching hot weather, without anything like a breeze for days, and filth from an old stranded vessel now exposed," followed by a mortality of one in every seven. †

At New Orleans.

Probably no condition is so eminently injurious to the salubrity of New Orleans, as this great humidity, not merely of itself, but it furnishes the agency, either by solvency, combination, or otherwise, with temperature, for those influences that are so destructive to health and life here. The actual amount is shown in the tables, (and I wish I had room to show the comparison with other countries.) A very partial examination of these tables will clearly demonstrate, when contrasted with the monthly mortality, how destructive to health is a nearly (and indeed often) saturated atmosphere, accompanied with high temperature. *We have never had an epidemic yellow fever in this country, without this combination!* most of these records are before me, besides a personal recollection which extends back upwards of thirty years. I am aware that there have been counter statements, but they are entirely unsustained by records or experiments. The temerity has even gone so far as to refer to years, to corroborate it. My meteorological journal for those years show them to be void of accurate data.

Denied.

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*Goupillian, from La Roche. † Communication through Prof. Blodget.

But recorded proof of its correctness.

Two years have been specified, viz: 1837 and 1841, as being *very dry*, and at the same time *epidemic years.* My Meteorological Journal states for the first, that although for the whole year, the total amount of rain is small, yet there fell during the month of September, (the very month in which the mortality was more *than double that of any* other month,) *more rain fell than the average of the ten preceding Septembers!* That there fell during the preceding three months more than ten inches of rain, and that in October, which was the next most fatal month, there fell more *than double the average* of five preceding Octobers! and that of the latter, (or 1841,) *more than* 50 *per cent.* of rain fell that year, than the average of the preceding ten! So much then for facts and records, *vs.* memory and speculation!

Unfounded statement of Darby.

Positive proof of its erroneousness.

Mr. Darby, who has written a work on this country, of quite considerable authority, about half a century ago, is represented to say in it that "for eight months in the year, *after* the season of inundation, *lower* Louisiana is drier than any woodland in America." He does not pretend to sustain this hazardous assertion by any records of precipitation, or other evidences. It is not probable, with the great removal of forest growth, which tends to dry a country more than anything else, which has taken place since this was written, that it has tended to make it *more humid!* From a hydrographic survey, *one-eighth of the State is constantly under water; two-fifths of it subject to inundation!* In Louisiana, we have two rainy seasons; that for New Orleans culminates in February and July, which differs but little from that of other parts of the State, excepting, probably, West Feliciana, which in a period of thirteen years, terminating in 1833, had then *three* rainy seasons, (April, July and December,) with an annual average of 61.344 inches! The annual precipitation on Red river, near Alexandria, was 67.400 inches; of Plaquemine parish, below New Orleans, 67.080 inches, and in this city a fraction over 52 inches. From these causes, her extensive morasses, impermeable soil and flat country, Louisiana is unquestionably *now*, and no doubt, has *ever been* the most humid State in North America. These circumstances give rise to our constant fogs that are so injurious to health. Were the swamps in our neighborhood drained, and forest growth removed, these would in a great measure subside, and their morbific influences abate.

Moisture indispensable.

We do not pretend to say that the yellow fever is rife in proportion to the amount of moisture existing in the air; but we do not doubt that a large amount of it is *indispensable* for it. When satisfactory scientific investigations on this subject shall be extended to all the places of its occurrence, even that amount may be determined. Whether it is a mere vehicle for the poison, or prepares the system for its influence, or it is the combination, a large amount is certainly required for the existence of the disease. Hence then, the discrepancies upon the subject, neither alone being sufficient, but with both and a high temperature the disease is not often absent.

Proof in Flanders.

Dr. Home made some experiments to show the connection of humidity and disease in a campaign in Flanders. He carefully measured daily with the hygrometer the degree of moisture and dryness of the air, and upon comparing his tables with the register kept of the sick, he found that the progress of the disease kept pace, as far, he says, as anything of the kind can do with the humidity* of the air. The whole meteorological condition has been kept by me here for many years, including the hygrometry, and it has always appeared to me that the *direct* influence on the health of individuals, with its varying conditions, not only in yellow fever, but with large classes of disease, has always been clear and unequivocal. Its influence last year I have shown to have been very conspicuous. The special details for the epidemic months are given in the tables, as taken five times daily, with the cotemporaneous mortality; the *dates* of the occurrence of the disease would have been more exact, but could not be procured.

It is supposed there is necessarily great moisture at sea, and that where there is a foul vessel much disease should exist in warm weather. There is a great mistake upon this subject; it is now well known that the main means to keep a vessel healthy at sea, is not merely to keep her clean but *dry*—by stoves, dry rubbing and other means. The evaporation from the sea has been greatly overrated. The calorific rays mostly pass beyond the transparent surface and are lost below; in proof that the temperature of the sea, when deep, is not influenced by the sun; but when we arrive "off soundings" the thermometer gives us the earliest warnings of it by its depression, the dew point is not as high far out at sea as near the shore, and but little dew falls; hence the little injury sustained from sleeping exposed to the air at sea. But when we approach a coast it is very different, and especially the estuaries and mouths of rivers, as I have ascertained by actual experiment. On the deadly coast of Africa, a few miles from land there is entire protection from the maladies of that sickly region, but near shore, and particularly near the mouths of the rivers, it is very moist and very sickly. That keen observer, Dr. Rush, attributed the difference in salubrity of the two, to "a mixture of land and sea air." Our more accurate means of research, that science now furnishes in the hygrometer, enables us to explain it with more precision.

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* La Roche.

Error in supposing great moisture at sea.

It is only so near shore.

Of the direct effect of swampy districts upon the health, even of those accustomed to them, reference is most confidently made to the sanitary condition of the four Southwestern States as exhibited in sanitary maps prepared expressly to exhibit it, made from the returns to the census bureau for 1850, showing the condition of each one of the counties of those States by the author, and published in the 5th volume of the Transactions of the American Medical Association.

Effect of swampy districts on health.

The examination into the effect of the imperfect drainage of towns under the authority of the English Government, is still more direct and applicable to the subject under consideration. I quote briefly from various parts of these valuable reports, to show the influence of it in the high latitude of 53 deg. How much more injurious must it be here. "When a street is wholly without

Effect of drainage of towns on moisture and on health.

drainage fever instantly breaks out in it." "Particular houses were pointed out, from which entire families were swept away, and from several of the streets fever is never absent." We find a very striking account of a "fever constantly breaking out in a General Lying-in Hospital, clearly traced to the influence of above fifteen hundred yards of open ditches, full of the stagnant filth of the neighborhood, (like Gormley's and others,) and to the backing up of the main drain of the premises, whereby the whole basement was flooded with every description of decomposing impurities. On the removal of these nuisances, together with a new method of ventilation, the fever disappeared. Another instance is given of a "village in a slight hollow, and badly drained, with a wide, stagnant ditch passing through it." "Here the deaths by epidemic disease were thrice as many as in a village in the neighborhood, and the scarlet fever was so malignant as to be fatal in a few hours." Sometimes, in the best ventilated squares, "the neighborhood of the cess pools, and a number of untrapped openings produce the most malignant fevers." Liverpool, which is situated in one of the best natural sites, is the most unhealthy city in England, because a large number of her population live and sleep under ground, and she has thousands of houses and hundreds of courts without a single drain of any description. "A table is given of districts in Leicester, being divided into three classes; first, culverted; second, partly culverted; third, not culverted. The proportion of persons dying of epidemic diseases are, in the first one-twelfth, and in the second only one-eighth of those who died in the third!" In some of the towns the description would fail to convey any conception, says a talented physician, of the disgusting and poisonous condition, and he exclaims "can such a state of things exist in a country which has made any progress in civilization?" Yet, such a description would well apply to many parts of this city during the last summer!

It is a matter of record that the intermittent fever in the rear of this city has greatly increased since the exposure of the swamp in that neighborhood, probably twenty to one of what it was before.

The amount of moisture depends upon the dissolving power of temperature; the question is then, not exactly what that amount is, so far as mere saturation is concerned, for the effect of saturation at different temperatures is very different, (as shown how comparatively innocent it is in the cool, moist climates of London and Holland, compared with intertropical regions, with their elevated temperature,) but it is the influence of the *combination* at this *high temperature*, and to such an extent as to co-operate with all the powers co-existing, that are more or less incompatible with health, and especially, with those unaccustomed to or unacclimated to them.

Amount of moisture dependent on temperature.

Of the fact of a high degree of moisture in an elevated temperature, being injurious to health, we trust the above evidences are sufficiently satisfactory. The explanation, or *modus operandi* may be more difficult. That it relaxes and prostrates the system is a matter of common experience; that it prevents the elimination of effete and worn out excretions, that it debilitates, by excess of action, the healthy functions of the skin and lungs, every one will acknowledge who has experienced it—diminishing the decarbonizing power of the atmosphere which is always lessened as the temperature is high, air expanded and saturated with humidity. When the hygrometry changes to a dry air a sensation of elasticity is at once experienced; when it becomes high, languor and prostration has to be endured; that our health is influenced in a corresponding degree, is fortunately, now fully established. *High temperature* may produce the physical susceptibility—*moisture* may be the medium of agents from our second condition, and when they are all in excess, the malignancy of the disease, will be proportionate. Such has been the precise condition of things here last summer.

How great humidity acts.

That there is dew point peculiar to each of the higher classes of fever (in their aggravated or epidemic grade,) is doubtless true from what we know of the temperatures essential to their existence, and how greatly they are all injured by humidity. The dew point of yellow fever is from 70 to 80, it rarely exists long, when it is under 60°. The plague has probably a dew

The dew point limits of yellow fever.

Plague.

Typhus gravior, and cholera.

point of 10° less. The typhus gravior at from 35° to 45°; and the cholera in this climate, varies from 48 and sometimes much less to 74, and is probably less controled by its fall than yellow fever.

Sources of it here.

The *sources* of this great excess of humidity are mainly the swamps, lagoons, lakes around us and which are also the principle causes of our fogs, imperfect drainage and want of pavements.

Radiation as a cause of disease now first noticed.

'Yellow fever weather' described.

Radiation,* as a source of disease, has not heretofore, as I am aware, attracted the attention of professional men; yet, no observant practical man who has passed through many epidemic yellow fever seasons, could have failed to notice, the peculiar weather that usually exists during the *clear* days of those seasons. In fact, old experienced men out of the profession have been in the habit of denominating it "*yellow fever weather*," without analysing the conditions which constituted it. It is characterized by being *very hot in the sun and cool in the shade at the same time*—on one side of the street a broiling temperature, and on the other so cool as to urge to buttoning up the coat. This uncomfortable alternation of chilliness and heat, is productive not only of uncomfortable feelings, but when exaggerated, passes into disease—constitutes the first stage of yellow fever. It may be here only the exciting cause, developing dormant disease, from the predisposition being already present. The difference of the temperatures between sun and shade, is at these times, very great, and essentially constitutes, *with other circumstances*, a sickly season. My attention has been called to it for many years, and it has been carefully noted by me not only here, but in other countries. I have not remarked it to influence materially other diseases, beyond the class of *fevers*, except *coup de soliel*, of which doubtless it is the principal cause. During last year it occurred unusually early, in January, and furnished one of the grounds of the prediction of the great epidemic. This principle is illustrated in the accompanying Chart No. 2, and Tables D, E, N, O, to which reference is invited. A more thorough proof could be made by a comparative exhibit of other years. It is too minute for this paper, but the opinion expressed is fully borne out. The unusual amount of solar radiation last summer, has been fully proved in several parts of the yellow fever region. It has been particularly noticed at *St. John Baptist,* by Dr. Delery of this city, where he remarked that "the planters found the sun's rays so intense, that they were compelled to use umbrellas *for the first time* as a protection against it," the yellow fever prevailed here very extensively. It was also noticed at *Hollywood* and at *Gainesville.**

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* Solar radiation, derived from the difference between the temperatures of the sun and shade.

Shown elsewhere, at St. John Baptist.

At *Gainesville*, Mr. Fulsom had found the heat in the sun so great that he frequently rode under a tree, to avoid its intolerable influence, and for fear of taking *a chill*, he was presently *compelled* to *quit* the *shade!* The same facts were observable at Hollywood, and in Wilkinson county, in the unusual and uncomfortable difference between the temperatures of sun and shade. Dr. Benedict observed the same thing in New Orleans, as early as July, when "in riding in a gig in the streets, with the top up, it was found so cold as to compel him to lower it, to procure the warming influence of the suns rays. This was soon found so scorching as to induce him again to put the top up! and this *was several times alternated* from the great difference in the extremes of each.†

At Gainesville

At Hollywood.

In New Orleans.

These remarkable conditions would doubtless have been recorded at other places, had the attention of observers been called to them. It is probably the "fiery something," to which yellow fever has been formerly attributed by those distinguished and experienced observers, Drs. Chalmers and Lining, of Charleston. The profession may be assured that it plays a much more important part in influencing the production of morbid action, than is yet known. Its precise modus operandi I forbear to speculate on. Is it by decomposing ozone, the great purifying principle? The direct causes of the varying radiations of different climates,

Probably the "fiery something" of Chalmers and Lining.

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* See testimony. † Refer to Dr. Benedict's interesting paper.

elevations and periods of the day, are quite obscure. In experimenting on this subject, I have often noticed a variation of from 5 to 10° occur in a few minutes, (from 5 to 20,) without any apparent difference in the clearness or transparency of the atmosphere or change, of the winds.*

Terrestrial radiation.

Where the principal danger of night air.

Terrestrial radiation (or that proceeding from bodies on the earth,) is the true interpretation of the danger of exposure to the night air. This exists in excess in sickly climates and seasons. It constitutes what is so much admired in the dangerous, but "beautiful blue sky of Italy," the air so clear and transparent, (upward radiation,) rapidly cools the body, chills it, and often preludes the first stage of fever. It is as tempting as hazardous in hot weather. An umbrella, portico, tree, musqueto net, *any object* intervening between the body and clear sky, protects one from it. In the thickly built parts of cities, this radiation is very small. The best radiators are cotton, silk, wool, (rotatively,) and consequently we are least protected by clothing made of those materials, in the order mentioned. We thus interpret the alledged injurious effects of sleeping exposed to the direct influence of the moon. It is always greatest on bright and brilliant nights.

Increase of radiation in proportion to increase of latitude.

Proofs.

For the proper appreciation of the chart and tables, it may not be out of place to state, not only that this is not merely a most unusual amount of radiation for this climate, but that the popular estimate upon the subject is a gross error, so far as it supposes that the intensity of *direct solar heat* increases as we approach the equator; *in fact. it is just the reverse!* Baron Humboldt found "the difference between the temperature in the sun and shade at Cumana, one of the *hottest, driest, and healthiest* in the lower regions of equinoctial America, never exceeded 6° 6', sometimes not more than 1° or 2°. Captain Sabine found the maximum at Sierra Leone 18°; at Bahia, on the coast of Brazil, 9°. I have rarely seen it exceed 20° in Cuba or Vera Cruz, and have often remarked how seldom umbrellas are used in tropical countries, and how rare it is to have many trees *immediately* around their houses to protect them from "the *ardors of a tropical sun!*" There are some grounds for the belief that it either increases with elevation, or we become more sensible of it, from diminished pressure of the atmosphere, for such seems to be the case on ascending mountains. De Saussure states it as the result of his experience on his ascent of the Alps, and it was of mine in Mexico; so dangerous is it esteemed in the elevated regions of Mexico that the natives always carefully protect the loins. of their horses (their weakest part) with an extra covering of skin, when in use, and often their heads. In Jamaica, while on a level with the sea, the difference between two thermometers, (or radiation, the one in the sun and the other in the shade) was at the maximum 12°; on the mountains it was nearly double. In England, it is usually found about 50°, and sometimes as high as 69°; while it has been found at Mellville Island, latitude 65° North, 55° in March, and *sometimes as high as* 90°! Captain Scoresby, in latitude 80° 19, found it *as high as* 80°. Sir John Richardson, in his late expedition to the Arctic climate, found the power of the *direct rays* of the sun so great, in a cloudless sky, that he had to "take shelter in the water while the crews were engaged on the portages!" and Captain Scoresby found that the pitch in the seams on the side of his vessel, *occasionally becomes fluid*, (which it *never did on the coast of Africa*), a temperature of almost 130°, while ice *was rapidly generated on the other, in the shade!*

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* The reason why persons insulated, or confined to the house, are rarely subject to yellow fever, may be that they are not exposed to solar radiation.

Influence of elevation upon it.

Illustrations.

Let us apply these remarks, for a moment, to the economy of nature, and see if we cannot draw some illustrations in proof of the correctness of the statement. It is thus that we can account for the productions of the rapid Springs in the Northern climates, where vegetation leaps, as it were, at once into being, while, if otherwise, its productions would not have time to mature and ripen for the sustenance of man. The cereal crops are known to be so much dependant

Proofs, in its influence on the vegetable kingdom.

upon its amount, that it has become a matter even of *calculation* in England, and it is so well known that without the *direct rays* of the sun (whatever may be the temperature of the air) that fruits seldom come to perfection. So great is this radiation in England, that many *tropical plants* cannot bear the *direct rays of the sun there*, and require protection in order to reach maturity! That the indirect (or shade) temperature is not solely dependant upon the *direct*, is proved from the fact that they reach their culminating point almost always at different periods, and the exceptions here *are during the occurrence of epidemics!* In non-epidemic years the highest point is probably in May. So, in England, it occurs about *two months in advance* of their *highest temperature.*

These views, now so well established among scientific men, in their influence on the vegetable, and even the animal kingdom, extends beyond their bearing, on our profession, but I forbear its introduction, tempting as it is.

Radiation worthy of farther investigation.

Should I not have been entirely successful in establishing the connection of radiation as one of the efficient agents in the production of yellow fever, I have, at least, pointed out a new field for philosophical investigation, that has hitherto escaped the scrutiny of pathological induction. It is certainly shown to be within the laws of the dynamic forces, and highly worthy the notice of the etiological inquirer.

Pardon is asked for this digression from a subject as novel as it is interesting and important. It is clearly apparent that it is entitled to more thorough investigation than it has yet received. What is due to each climate is not known. I have long since requested the Smithsonian Institution to add it to the requirements from its meteorological correspondents, throughout the country. It would not depart far from the rules of probability to say that whatever influences the physiology of the vegetable and animal creation must also influence their diseases. In this climate, I do not consider ten years of observation sufficient to determine what is the normal amount, but believe that beyond 30° or 40° maxima, is productive of injurious influences.

Winds.—All experience has shown that free ventilation and strong, unimpeded currents of wind are inimical to the elimination and concentration of malarial exhalations, consequently, to the production of fever; that where the winds blow strongly and freely, and find no obstacle from surrounding objects, or intervening forests, localities which otherwise, might be expected to be fruitful sources of fever, may be visited or inhabited with impunity, while similar places become insalubrious, if the air is stagnant.* Calms, says Dr. Drake, permit the exhalations from foul localities to accumulate in the atmosphere, which rests over them, but all winds operate to disperse and dilute them with purer air.

Influence of winds.

By reference to the table P and Q, it will be seen that on an average of years our most prevalent winds during the summer are the East, South, SW. and SE., and by referring to the table of the hygrometry of the winds here, (or the amount of moisture each of these conveys with them, table P,) it will be found that these are the very winds which are usually loaded with the largest quantity. That table also shows that when the air becomes calm (or stagnant) it becomes still nearer the point of saturation. During the worst period of our epidemic the most frequent wind was from the East. That is a pretty constant feature, not only in our epidemics, but most others. Still more remarkable was the frequency and long duration of onr calms, with all their injurious saturations and depression of the vital principle.

Amount of moisture in each.

Direction.

Nearly all land winds are unpleasant, if not deleterious to health, in most climates, producing a sensation of chilliness and discomfort far beyond their mere thermal influence. It is the "simoon," of most countries; in Havana and Georgetown, Demarara, it is a South wind; here, and in Texas, where it is felt so severely, it is a North wind. These winds produce a rapid evaporation from the surface of the body, causing extreme dryness, while the sun is unclouded and hot, (during the warm months,) and is excedingly uncomfortable. Fevers of a bad

Unwholesome nature of land winds in summer.

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* La Roche.

character are then known to prevail. It was upon this ground, mainly, that I have advanced the opinion of the protective influence of Lake Pontchartrain.

System of balances.

No one can doubt that there is a great system of balances in the natural, as in the moral world. In the animal and vegetable kingdoms a great predominance of either, is unfavorable to the other; where they are equalised, health results. Great heat and moisture promotes an excess in vegetable life. It is injurious to man. All excess tends to disease, while moderate changes are conducive to health, "all natures' difference, is all natures' peace." This has been often remarked in hot and other climates. During the late epidemic yellow fever, at Bermuda, it was remarked that "an extraordinary state of atmosphere prevails here now, very favorable to vegetable life, but dangerous to animal life and health."

Apology if records imperfect.

We think sufficient has been said to show in what this epidemic consisted. We would not be understood to mean, that the exact amount of heat, moisture and decomposed materials, were ascertained to have produced it, and that there were no other materials than those we have enumerated. For the more exact application and showing of these influences, the meteorological journal of the three epidemic months is annexed, in detail, as noted four or five times daily, made up during the intervals of the exacting demand for our time during that laborious period, (the month of July was kindly kept for me by my friend, Dr. Benedict, and the balance by myself.) Every record was made that was in our power, conscious as we felt, that we were in the midst of the most important, and therefore, the most interesting, pathological year, that ever occurred in America, and that we should be held responsible, by the scientific part of the profession, and the public, to make every observation that could have any bearing or influence upon *it*, and therefore *our*, future; and have essayed to make a faithful statement of that gloomy period. How it will apply or aid us in influencing that future, time alone can tell. No such exact or extensive record is known to us as having been made before with which to compare it. But we trust many such, and better, will be made hereafter, should it be the misfortune of this, or any part of our country, to be afflicted with a similar calamity.

The exact amount of the *meteorological and terrene causes* to produce fever, and especially, a malignant epidemic yellow fever, is not known; it may be hereafter. A distinguished authority informs us that "since the beginning of the world, the temperature and humidity of the atmosphere have, perhaps, not been twice in identically the same circumstances for eight conscutive days."*

Exact amount of the materials for an epidemic not known.

However this may be, and as duration is an important element in everything relating to health, there is no doubt of the fact that all the agents productive of yellow fever, whether climatural or terrene, are in the nature of things more or less fluctuating. So is the physiological condition of the individual; but I have as little doubt that it is an approximative duration around a very narrow circle that is required to produce the impression resulting in a yellow fever season; that is, that an elevated temperature, high saturation, excessive radiation, with terrene causes in large amount, shall *coincidently exist*, although they may slightly fluctuate, for a period, which, according to my observation, to overcome the physiological or vital resistance, shall be rarely less than about two or three weeks, dependent upon the susceptibility of the individuals exposed. It is under such circumstances that yellow fever rarely fails to follow. During my long residence in this climate I have rarely seen such a prolonged continuance (the above duration) of identical weather, if in excess, whether of heat or cold, dryness or moisture, but was productive of disease of some kind. Variable weather and seasons are usually healthy, though this is opposed to popular belief. Such is the play of the organism, and such are the variations required to give it tone and impart to it vigor. Professor Schönbein has given many reasons for the belief that fever arises from a deficiency of

Duration required for disease to be developed.

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*Arago and Schubler.

ozone. No experiments were made to test it here. If ozone is developed, as is alleged, by the approach of two clouds of different electricities, that often takes place during the existence of our yellow fever epidemics, with, as before remarked, *injurious effects*, its evolvement may be at too great an elevation above our immediate atmosphere to benefit us. If we possessed the certain power of foretelling, long beforehand, and *always*, the advent of a great epidemic, thousands of lives would be saved. I do not know that we could do as much by filling the atmosphere with ozone, which would be very costly. A writer in one of the prints during the summer advises its being "drowned out," which I thought highly plausible, if possible, the Mississippi river at such periods having usually descended so low as, if introduced, could only influence the low back streets. But the *cheapest, best and most rational mode*, after all, will be found in the practical application of the *means of prevention*, by the introduction of those sanitary measures that experience, fully tested, has shown to have saved other communities from pestilence, and restored them to salubrity. They will be fully detailed hereafter.*

Advantage of foresight and remedies.

In this early application of meteorology to disease, I ask the indulgence of the profession for the paucity of my records. Enough has been given to show that the connection is most intimate between them, sufficient to assure us of vast hidden truths, far beyond our present means of investigation; these truths are of value to science and humanity ; indeed, there are no useless or disconnected truths in the great labo-

No truths valueless.

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* Tables C, D, E contain the daily meteorological and mortuary condition during the three epidemic months. I would gladly add the whole year of both were the latter practicable, for the gratification of scientific men, to show how much climatic conditions influence our weather, and especially, during this remarkable year.

In interpreting the connection of meteorology with *mortality*, two circumstances are to be taken into consideration : first, the amount of vital resistance to be over come previous to the attack, (for it cannot be at once,) and second, the period to elapse before resulting in death. These, as yet, are indeterminate and irregular periods, dependent upon individual susceptibility and constitutional power. The second is easier estimated than the first, for the *average* duration of the *disease* is from three to five days. We sometimes find in the advanced period of the season that a sudden great fall in temperature produces a frightful mortality, cutting off all who are very sick, unless carefully protected; and here a little foresight of a coming change can often be put to most valuable use. In this case it is almost equally apt to prevent the further continuance of the disease, *provided the change is a permanent one.*

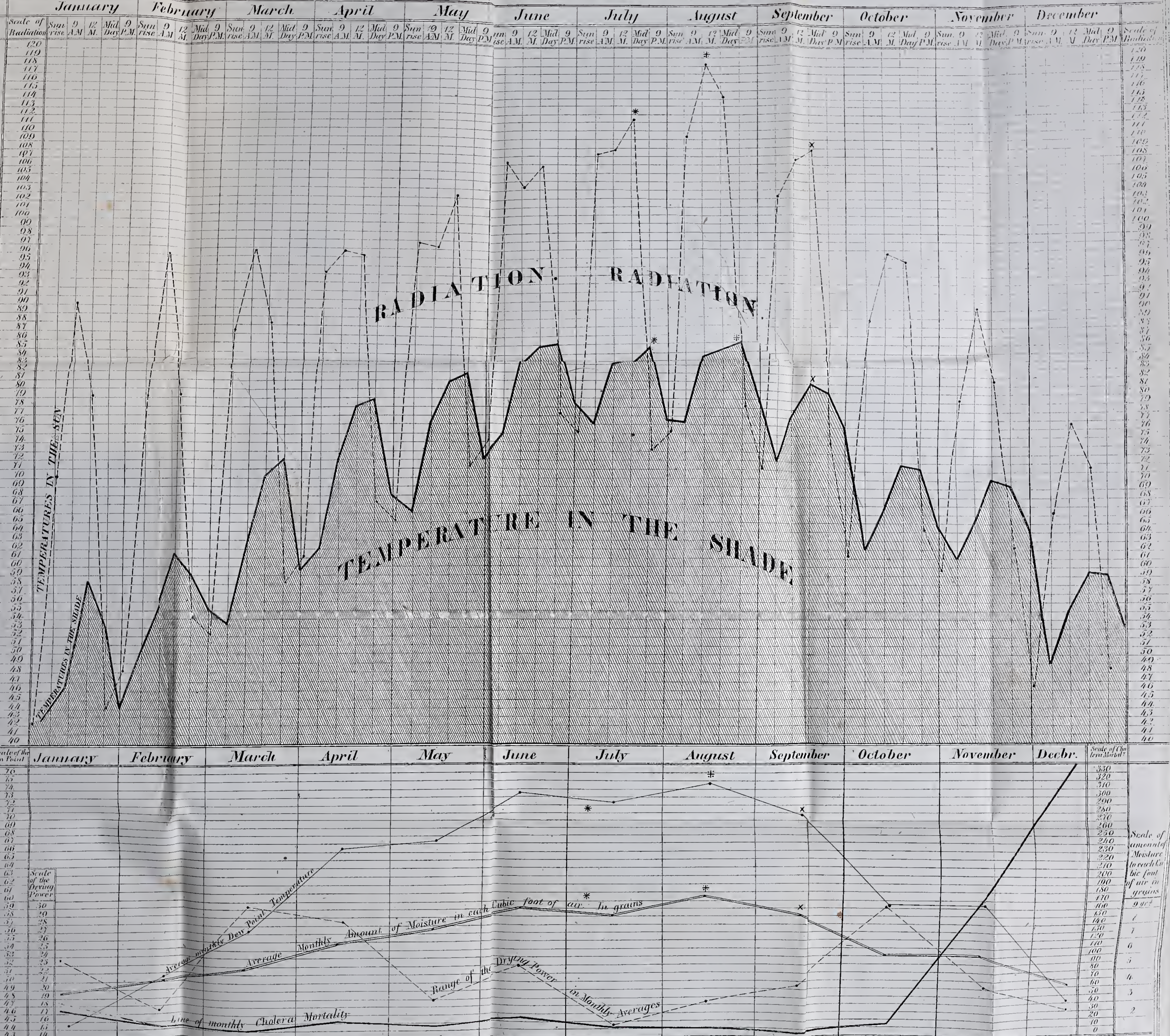
…the influence of SOLAR and TERRESTIAL RADIATION and MOISTURE in the production of YELLOW FEVER in NEW ORLEANS DURING 1853

Prepared for the Report of the Sanitary Commission **BY E. H. BARTON A.M.M.D.**

EXPLANATION

The ---•--- Lines indicate the Temperature in the Sun The ——— that in the Shade. Each five times a day

The ✱ indicates the commencement of the Epidemic 10/15 July. The ✱ the culminating point 19/24 Aug. The × the declination 21/25 Sept.



	January	February	March	April	May	June	July	August	September	October	November	December	
Yellow Fever mortality for each month	2	1			1	21	1409	5362	113	205	25	11	8.093
Total mortality	679	444	463	532	671	656	2216	6201	162	674	712	844	15.746

"C." Meteorological Register, for New Orleans, kept by E. H. Barton.

JULY, 1853. LATITUDE, 30°. LONGITUDE, 90°.

Altitude of Thermometer above the Earth 5 feet.
do of Rain Guage,.................. 15 feet
do of Barometer above the sea,...... 11 ft 141

Explanation.

ASPECT OF SKY.—0 Represents entire cloudiness,
1 " a slight degree of clearness, and so on, until
10. " which represents entire clearness

WINDS —0 Signifying calm,
1 a very gentle breeze,
2 a gentle breeze,
3 a fresh breeze.
4 a strong wind.
5 a very do. do
6 a violent storm.

Day of Month.	Barometer at Sun Rise.	Barometer at 9 A. M.	Barometer at 3 P. M.	Barometer at 9 P. M.	Range.	Thermometer outside, in open air, in shade, at Sun Rise	Thermometer 9 A. M.	Thermometer 3 P. M.	Thermometer 9 P. M.	Average.	Range.	Aspect of Sky at Sun Rise.	Aspect of Sky 9 A. M.	Aspect of Sky 3 P. M.	Aspect of Sky 9 P. M.	Anemometer, Course and Force of Wind at Sun Rise.	Anemometer 9 A. M.	Anemometer 3 P. M.	Anemometer 9 P. M.	
1	30.13	30.13	30.11	30.14	.03	77°	84°	86½°	80°	81	9	5	6	4	10	N. E. 1	N. E. 1	S. 2	S. 1	
2	.12	.17	.17	.16	.05	79	87	80½	78	81	9	9	5	0	8	S. E. 1	S. 3	S. 2	E. 1	
3	......	.13	. 8	.23	.10	....	84½	82	81	..	3	..	6	6	10	......	S. 2	S. W. 1	0	
4	.14	.29	.23	.25	.11	78	80	83½	79½	80	5	8	1	4	10	W. 1	W. 3	S. W. 1	0	
5	.24	.26	.21	.25	.05	78½	85	78	78	79	7	9	5	0	10	0	S. 1	E. 1	0	
6	.26	.27	.25	.30	.05	76½	82	81	76	78	6	7	6	1	0	S. 1	0	0	0	
7	.30	.33	.34	.35	.05	76	79	78	76	79	3	0	0	6	0	0	S. E. 1	0	0	
8	.35	.36	.32	.35	.03	75½	77½	83½	79½	70	8	0	0	9	10	N. E. 1	E. 1	S. E. 1	0	
9	.36	.37	.34	.32	.05	77	84	84	80½	81	7	2	5	4	10	0	S. E. 1	S. 1	0	
10	.35	.35	.28	.34	.07	79	86	85	79½	82	7	8	1	4	10	0	S. W. 1	S. 2	0	
11	.32	.32	.30	.24	.08	77	84	78	75½	78	7	6	5	0	0	0	S. W. 2	W. 1	0	
12	.23	.24	.20	.22	.04	74	75	78½	76	78	5	0	0	0	8	W. 1	W. 1	W. 1	S. W. 1	
13	.25	.28	.23	.26	.05	74½	73	79½	77½	76	7	0	0	1	0	S. W. 1	S. W. 1	S. 1	S. W. 2	
14	.28	.27	.24	.25	.04	76	80	82	78	79	6	0	1	0	5	W. 2	S. W. 2	S. W. 3	0	
15	.25	.27	.20	.22	.07	78	84	83	80	81	6	5	4	1	8	S. W. 2	N. 3	E. 3	0	
16	.19	.21	.17	.18	.04	78	85	83	77½	80	8	2	2	0	3	S. W. 3	S. N 3	S. W. 4	S. W. 3	
17	.20	.21	.21	.26	.06	78	85	87	80	82	9	6	6	8	10	N. W. 2	N. W. 2	N. E. 2	S. W. 1	
18	.28	.33	.28	.32	.05	77	85	88	80½	82	11	0	6	8	10	S. W. 1	N. W. 1	S. 2	S. W. 1	
19	.34	.35	.35	.36	.02	78	85	86½	81	82	8	0	6	3	8	0	S. E. 1	S. E. 1	0	
20	.37	.35	.33	.32	.05	78½	86	89	82	83	11	7	6	8	9	0	S. SW. 3	S. W. 3	S. W. 2	
21	.30	.31	.29	.22	.09	79	87	79	76½	80	8	8	8	0	6	S. W. 1	W. 2	N. W. 2	S. W. 1	
22	.22	.23	......	......	..	74½	76	78	....	..	4	0	2	..	..	E. 2	0	......	......	
23	.21	......	......	......	..	76	....	....	....	..	..	0	..	..	..	N. W. 1	......	......	......	
24	......	......	......	......	..	....	....	....	....	..	..	..	..	..	..	......	......	......	......	
25	.28	......	......	......	..	79	....	....	78	..	..	0	..	..	..	S. W. 1	......	......	......	
26	......	.22	......	.20	.02	....	78	....	79	..	..	..	..	..	0	......	......	......	......	
27	.22	.35	.18	.23	.17	75½	76	78	75	76	3	0	0	0	0	0	......	W. 1	......	
28	.27	.31	.30	.33	.06	71	76	81	78	76	10	1	..	..	..	N. 1	......	......	......	
29	.26	.28	.34	.34	.08	75	83½	86	78	80	17	10	..	0	10	S. 1	......	S. 3	0	
30	......	.33	.30	.32	.03	79	85½	79	79	80	7	..	..	0	10	......	......	N. W. 2	0	
31	.32	.32	......	.21	.11	77½	85	82	79	80	8	10	..	..	10	N. E. 1	......	......	......	
Totals,...	81704	84784	72621	81715		2152	2292	2019	2036		193	103	79	61	177	N. 3=¾d	N.E. 5=1¼	E. 5=1¼	S. E. 6=1½ calm 26=6½	Direction.
Averages,	30.260	30.280	30.258	30.264		78.85	82.03	82.18	75.41		7.14	3.81	3.43	2.54	6.80	S.13=3¼	S.W.24=6	W.9=2¼	N.W. 6=1½	Direction.
																N. 2.33	N. E. 1.20	E. 1.60	S. E. 1.00	Force.
																S. 1.69	S. W. 1.83	W. 1.33	N. W. 1.66	Force.
Total do............	30.265					79.88						4.14				1.58				

Day of Month.	Temperature of Evaporation & Dew Point. At Sun Rise. Temperature of Evaporation.	At Sun Rise. Dew Point.	At 3, P. M. Temperature of Evaporation.	At 3, P. M. Dew Point.	At 9, P. M. Temperature of Evaporation.	At 9, P. M. Dew Point.	Range.	Daily Humidity.
1	76	75.6	78	75.5	78	77.3	1.8	.954
2	78	77.6	76	74.6	76	75.3	3.0	.902
3	....	.....	75	72.5	78	77.0	4.5	.815
4	77	76.6	77½	75.0	78	77.6	2.6	.869
5	76	75.3	76	75.3	76	75.3	0.0	.939
6	76	76.0	77	75.6	74	73.2	2.8	.917
7	75½	76.0	75	73.9	75	74.6	2.1	.914
8	74	73.6	75	72.2	77	76.3	4.1	.844
9	74	71.4	77	74.7	78	77.3	5.9	.837
10	76	75.0	77	74.4	77	76.3	1.9	.834
11	76	75.6	75	73.9	74	73.6	2.0	.939
12	72	71.1	74	72.5	74	73.2	2.1	.883
13	73	72.6	77	76.3	76	75.6	3.7	.930
14	74	73.2	78	76.7	77	76.8	3.6	.904
15	77	76.8	77	75.0	78	77.3	2.3	.883
16	76	75.3	78	76.4	76	75.6	1.1	.894
17	77	76.8	76	72.4	78	77.3	4.9	.826
18	76	75.6	77	73.5	78	77.3	3.8	.821
19	76	75.3	78	75.5	78	77.0	1.7	.927
20	76	76.8	76	73.2	78	76.7	3.6	.792
21	76	75.0	76	75.0	75	74.6	0.4	.992
22	74	74.0	....	.....	....	.....	...	....
23	75	73.2	....	.....	....	.....	...	....
24	....	.....	....	.....	....	.....	...	....
25	77	76.3	....	.....	78	78.0	1.7	.988
26	....	.....	....	.....	....	.....	...	....
27	74	73.6	75	73.9	75	75.0	1.4	.856
28	68	66.5	78	77.0	76	75.3	10.5	.887
29	74	73.6	82	80.9	76	75.3	7.3	.894
30		.....	76	75.0	78	77.6	2.6	.929
31	76	75.6	78	76.7	78	77.6	1.0	.912
Totals,....................	2029	20140	1994	18476	2070	18940	824	....
Averages,....................	75.14	74.59	76.69	71.06	76.66	70.14	3.05	....
Total Averages,....................	....	.....	....	72.13	....	.....	...	....
Drying power,....................	....	2.26	....	11.12	....	5.27	...	....
Average do....................	....	.....	....	6.21	....	.....	...	....
Average temp. of Evaporation....	....	.....	....	76.16	....	.....	...	....

RADIANT THERMOMETER IN SUN.

Average Radiation at Sun Rise was found to be,........ 0.30.
9, A. M. do........25° 00.
12, M. do........25 .15.
3, P. M. do........26 .78.
9, P. M. do........1 .67.

PLUVIOMETER.—RAIN. Date.	Began.	Ended.	Quantity
1st	8.52 A.M. 11.09 A.M.	9 A.M. 11.16 A.M.	.079
2d	3.05 P.M. Showers before day.	3.20 P.M.	.193
3d	11.35 A.M. 8.30 A.M.	11.46 A.M. 8.10 A.M.	.326
5th	9.38 A.M. 10.35 A.M. 12.25 P.M. 1.52 P.M.	9.43 A.M. 11.05 A.M. 12.38 P.M. 3.50 P.M.	3.225
6th	10.32 A.M. 5.38 P.M.	10.48 A.M. 6.00 P.M.	.200
7th	Gentle Showers. .12 M.	12.30 P.M.	.023
8th..	12.28 P.M.	12.32 P.M.....	.081
11th	12.23 P.M. 2.00 P.M. 3.00 A.M.	12.35 P.M. 3.30 P.M. 3.30 A.M.	.387
12th..	8.15 A.M.	10. A.M.....	.362
13th	8.30 A.M. 3.02 P.M.	11.20 A.M. 3.12 P.M.	1.354
14th ..	3.15 P.M.	3.50 P.M.....	.335
21st	2.52 P.M. 4.00 A.M.	4.30 P.M. 5.45 A.M.	1.300
22d ..	8.00 A.M.	8.30 A.M.....	.245
25th...	6.10 P.M.	6.50 P.M.....	.991
27th	5.25 A.M. 2.25 P.M. 7.00 P.M.	6.00 A.M. 4.00 P.M. 9.30 P.M.	1.360
29th ..	3.15 P.M.	4.48 P.M.....	.680
31st ..	1.35 P.M.	2.15 P.M.....	.067
Total,........................			11.708

Daily & Weekly Mortality from Yellow Fever	Ditto from other Diseases.	Total. Daily & Weekly Mortality.	Height of River *below* High Water Mark, which is usually about Fifteen Feet
4	24	28	4 feet on 2nd
From 1st to 8th, 59	129	188	5.10 on 10th,
to 13th, 204	140	344	6 feet on 17th
to 22d, 429	188	617	
to 26th, 297	84	381	6.6 on 24th
Daily, 100	24	124	
87	18	105	
128	26	154	
137	20	157	
109	33	142	7.6 on 31st
1.554	686	2240	

REMARKS.

The record this month has been kindly kept for me by Dr. N. B. Benedict.
Much thunder and lightning during the month.
Heavy rains, alternated with hot sun. Much damp weather
Thunder and lightning noted particularly on the 5th, 12th, 13th, and 29th.

RECAPITULATION.

	Barometer.	Thermometer.	Dew Point.	Degree of dryness on the Thermometric Scale.	Degree of Moisture on the Hygrometric Scale, 1000 being sat.
Maximum,....................	30.37	89	80.9	15.8	0. or sat. 5 obs.
Minimum,....................	30.11	71	66.5	0. or sat. 5 obs.	.610
Average,....................	30.265	79.88	72.13	6.21	.825
Range,....................	.26	18	14.4	15.8	.390
Average of daily range,..........	5.07	7.14	3.05	....	....

ASPECT OF SKY.	
Average. At Sun Rise,..............	3.81
9, A. M..............	2.43
Midday,..............	2.54
9, P. M..............	6.80
Average total,	4.14

QUANTITY OF RAIN

In inches and fractions,	11.708
No. of days on which Rain fell,	18
" nights " " "	4

WINDS. No. of days blowing,		Direction.	Force.
From the	N.	0¾	2.33
"	N. E.	1¼	1.20
"	E.	1¼	1.60
"	S. E.	1½	1.00
"	S.	3½	1.69
"	S. W.	6	1.83
"	W.	2¼	1.33
"	N. W.	1½	1.66
No. of days calm,		6½	
		Average total,	1.58

HYGROMETRIC CALCULATIONS.	At Sunrise.	At Midday.	At 9, P. M.	Average.
AMOUNT OF MOISTURE.	.930	.703	.842	.825
ELASTICITY OF THE VAPOR.	.893	.796	.773	.820
WEIGHT OF VAPOR IN A CUBIC FOOT IN GRAINS.	9.600	8.480	8.315	8.798

"D." Meteorological Register, for New Orleans, kept by E. H. Barton.

AUGUST, 1853. LATITUDE, 30°. LONGITUDE, 90°.

Altitude of Thermometer above the Earth 5 feet.
do of Rain Guage, ... 15 feet
do of Barometer above the sea,...... 11 ft 141

Explanation.

ASPECT OF SKY —0 Represents entire cloudiness,
1 " a slight degree of clearness, and so on, until
10, " which represents entire clearness

WINDS —0 Signifying calm,
1 a very gentle breeze,
2 a gentle breeze,
3 a fresh breeze
4 a strong wind.
5 a very do. do
6 a violent storm.

DAY OF MONTH.	BAROMETER AT Sun Rise.	9 A. M.	3 P. M.	9 P. M.	RANGE.	THERMOMETER outside, in open air, in shade, at Sun Rise	9 A. M.	3 P. M.	9 P. M.	AVERAGE.	RANGE.	ASPECT OF SKY AT Sun Rise.	9 A. M.	3 P. M.	9 P. M.	ANEMOMETER, Course and Force of Wind at Sun Rise.	9 A. M.	3 P. M.	9 P. M.
1	30,30	30,29	30,27	30,28	,03	77°	85°	83°	80°	81	8	10	....	....	..	N. E. 1	......	......	......
2	,27	.....	.....	,20	...	77½	....	....	80	..	....	10	....	....	..	W. 1	S. W. 2	......	......
3	.....	.....	.....	.....	...	....	....	....	82	..	....	....	....	....	..	......	......	......	......
4	.....	.....	.....	,19	...	77	86	88	82	83	11	....	....	....	10	......	......	......	W. 1
5	30,20	,22	,18	,17	,05	77	86	88	82	83	11	10	7	3	10	W. 1	N. 2	W. 2	N. 1
6	,19	,23	,20	,19	,04	77	84	85	79	81	8	10	10	0	0	N. W. 1	N. W. 3	N. E. 2	E. 2
7	,21	,23	,22	,20	,03	78	83	79	79	79	5	3	1	4	10	E. 1	E. 2	E. 2	0
8	,21	,24	,21	,22	,03	77	84	87	80	82	10	10	9	8	10	E. 1	E. 1	E. 2	0
9	,20	,25	,22	,23	,05	77	87	75	77	79	12	10	9	0	10	0	E. 2	E. 1	0
10	,26	,26	,24	,26	,02	77	84	74	76	77	7	8	9	0	9	E. 1	E. 2	E. 2	0
11	,29	,29	,22	,23	,07	75	80	85	78	78	6	9	9	0	4	0	N. 1	N. E. 1	S. 1
12	,24	,25	,21	,18	,07	76	83	85	78	80	9	8	6	1	0	0	E. 2	E. 1	0
13	,20	,23	,17	,15	,08	75	77	83	78	78	8	3	0	2	10	N. E. 2	N. E. 2	E. 3	E. 2
14	,78	,21	,17	,18	,04	75	84	83	78	80	9	8	7	0	10	0	E. 1	E. 2	0
15	,21	,24	,18	,20	,06	75	82	78	75	77	7	8	0	0	8	0	W. 1	0	E. 1
16	,17	,19	,15	,13	,06	75	80	83	73	77	8	0	1	0	8	0	W. 1	W. 1	0
17	,11	,12	,06	,04	,06	72	77	82	76	76	10	8	0	2	8	W. 2	W. 2	W. 1	N. W. 1
18	,07	,10	,08	,07	,03	74	83	83	77	79	9	10	5	0	6	0	W. 1	W. 1	0
19	,09	,12	,07	,18	,05	74	84	87	82	81	13	10	10	10	8	W. 1	W. 2	N. W. 2	W. 2
20	,09	,11	,11	,09	,02	79	86	91	76	83	15	10	8	6	8	W. 2	W. 2	N. 2	N. 1
21	,14	,17	,13	,14	,03	75	84	88	82	82	13	10	8	10	10	N. E. 2	W. 1	N. 1	S. 2
22	,16	,22	,20	,17	,06	80	84	76	76	79	8	8	3	0	0	W. 1	N. E. 2	N. 1	N. 2
23	,18	,22	,19	,18	,04	75	82	87	81	81	12	3	0	0	10	N. 1	N. E. 1	N. E. 2	E. 3
24	,17	,21	,16	,15	,06	76	85	89	81	82	13	10	8	10	0	S. E. 1	N. E. 1	N. E. 2	S. E. 3
25	,19	,21	,18	,18	,03	77	84	86	81	82	9	2	5	9	8	S. E. 1	S. E. 1	S. E. 1	S. 1
26	,21	,25	,22	,25	,04	78	85	84	81	82	7	9	8	2	10	0	E. 1	E. 2	E. 2
27	,26	,29	,22	,27	,07	78	86	86	80	82	8	9	7	0	10	E. 1	N. E. 2	E. 2	E. 2
28	,23	,28	,24	,24	,05	76	75	85	79	78	10	4	0	2	10	N. E. 3	E. 1	E. 2	E. 1
29	,21	,26	,23	,24	,05	77	85	87	79	82	10	0	2	10	10	E. 2	E. 3	N. E. 3	E. 2
30	,23	,27	,22	,23	,05	77	85	86	78	81	9	10	10	10	10	N. E. 3	E. 3	E. 3	E. 2
31	,16	,17	,13	,13	,04	75	83	86	80	81	11	9	10	8	10	N. E. 3	N. E. 2	N. E. 3	E. 2
Totals,...	87563	84623	84508	87527	131	2212	2327	2347	2284	....	265	219	152	97	277	N. 9=2¼	NE. 17=4¼	E. 36=9	S. E. 6=1½ calm 17=4¼
Averages.	30.194	30.222	30.181	30.181	4.68	76.27	83.10	83.82	78.75	....	9.46	7.55	5.62	3.46	7.75	S. 3=0¾	S. W. 0=0	W. 20=5	N. W. 4=1
Total do.	30.194					81.25						6.34				N. 1.33 S. 1.33	N. E. 2. S. W. 0.0	E. 1.88 W. 1.20	S. E. 1.50 N. W. 1.75

Direction. Force.

1,33

	Temperature of Evaporation & Dew Point. AT SUN RISE. Temperature of Evaporation.	Dew Point.	AT 3, P. M. Temperature of Evaporation.	Dew Point.	AT 9, P. M. Temperature of Evaporation.	Dew Point.	RANGE.	DAILY HUMIDITY.
1	75	74.2	80	77.1	78	77.3	3.1	.887
2	76	75.6	....	....	78	75.6	....	.943
3	....	....	....	....	....	....	....	....
4	....	....	....	....	80	79.4	...	.922
5	77	77.6	80	77.4	79	78.1	1.1	.857
6	77	77.6	78	75.8	78	77.6	1.8	.897
7	77	76.8	77	76.3	79	79.0	3.7	.954
8	76	75.6	78	75.2	79	78.6	3.4	.859
9	76	75.6	75	75.0	77	77.0	2.0	.890
10	77	77.0	74	74.0	76	76.0	3.0	.993
11	75	75.0	77	75.6	77	76.8	1.8	.926
12	76	76.0	78	75.3	74	72.5	3.5	.854
13	72	70.7	73	69.2	75	73.9	4.7	.790
14	74	73.6	76	74.6	76	75.5	1.7	.970
15	74	73.6	77	76.8	74	73.6	2.2	.956
16	74	73.6	77	75.0	73	73.0	2.0	.886
17	72	72.6	77	75.3	74	73.2	3.3	.904
18	74	74.0	77	75.0	75	74.2	1.0	.899
19	73	72.6	77	73.8	86	79.4	6.8	.834
20	78	77.6	77	72.7	73	71.8	5.8	.787
21	73	72.2	79	76.3	79	78.1	5.9	.835
22	79	78.6	75	74.6	72	70.3	7.3	.914
23	75	75.0	77	73.8	78	77.0	3.2	.845
24	75	74.6	79	76.0	78	77.0	2.4	.811
25	76	75.6	78	75.5	79	78.3	2.8	.856
26	77	76.8	79	77.5	79	78.3	1.5	.897
27	77	76.8	75	71.2	77	76.0	5.2	.811
28	75	74.6	78	75.8	77	76.3	1.7	.868
29	75	74.2	77	73.8	77	76.3	2.5	.824
30	74	72.8	74	69.7	73	71.6	3.1	.721
31	69	66.2	76	72.7	76	74.6	8.1	.743
Totals,........	2178	21649	2155	20915	2290	22019	939	....
Averages,........	75.10	74.65	76.96	74.69	76.33	75.92	3.35	....
Total Averages,........	....	....	....	75.08	....	....	....	....
Drying power,........	....	1.62	....	9.13	....	2.8	....	....
Average do........	....	....	....	4.52	....	....	....	....
Average temp. of Evaporation,	....	....	....	76.13	....	....	....	....

	RADIANT THERMOMETER IN SUN, AT Sun Rise.	9, A. M.	12, M.	3, P. M.	9, P. M.	PLUVIOMETER; RAIN. Began.	Ended.	Quantity	DAILY MORTALITY FROM YELLOW FEVER	Ditto from other Diseases.	Total Daily Mortality	Height of River below High Water Mark, which is usually about Fifteen Feet
1	75	89	......	......	80				117	18	135	
2	78	.....	......	......	88	12.58 P.M.	1.20 P.M.	.065	125	26	151	
3	.....	.....	......	......	.....	12.10 P.M.	1.05 P.M.	.071	127	23	150	
4	.....	.....	......	......	89				132	23	155	
5	76	97	98	100	80				198	40	238	9 ft. 2 in.
6	76	97	107	108	79				166	43	209	
7	78	.....	131	111	79	12.30 P.M.	1.20 P.M.	.680	196	32	228	
8	77	96	127	114	80				176	36	212	
9	76	116	120	......	77	1.20 P.M.	2.20 P.M.	.980	189	40	229	
10	76	119	117	......	.....	12. M.	1.30 P.M.	.080	197	20	217	
11	75	.....	114	......	78	2.20 P.M.	3.15 P.M.	.550	193	32	225	
12	75	110	117	......	78	12. M.	1. P.M.	.150	173	31	204	
13	75	.....	......	......	78				196	36	232	9 ft. 10 in.
14	75	128	126	......	78				193	30	223	
15	75	.....	......	......	75	10.20 P.M.	12.20 P.M.	.720	191	31	222	
16	75	.....	118	......	.....	3.15 P.M.	3.55 P.M.	1.100	193	26	219	
17	72	.....	131	128	76	4.30 P.M.	6. P.M.	.200	191	28	219	
18	74	125	120	......	77	11.30 A.M.	11. A.M.	.350	208	26	234	
19	74	137	148	132	82				192	37	229	
20	79	130	132	129	75	3.45 P.M.	4. P.M.	.340	235	34	269	11 ft.
21	74	120	132	132	81				244	39	283	
22	80	.....	......	......	75	7. A.M.	8.30 A.M.	.250	224	34	258	
23	74	.....	112	......	81	12. M.	12.30 A.M.	.420	191	31	222	
24	76	105	118	119	81				190	28	218	
25	77	105	112	120	81				155	38	193	
26	78	110	100	......	81				153	32	185	
27	78	112	......	......	80				119	29	148	12 ft
28	75	.....	......	......	79	12. M.	2.30 P.M.	.110	90	15	105	
29	77	105	100	110	79	6.45 A.M.	8. A.M.	.450	117	22	139	
30	77	102	110	112	78				100	37	137	
31	75	102	112	94	80				98	21	119	
Totals,.......	2202	2105	2632	1502	2118	....	....	7.016	5269	938	6207	....
Avr. exposed	7599	110.	119.63	115.53	7844	....	....	....	....	....	....	....
Avr. in shade	76.29	84.57	85.36	86.23	79.97	....	....	....	....	....	....	....
Difference, or radiation	.30	25.43	34.27	29.30	.63	....	....	....	....	....	....	....

REMARKS.

Much thunder and lightning throughout the month; during the intervals of the heavy rains, a burning sun, cold in shade; hot, damp, suffocating air; more "calms" than ever observed before; the average "force" of the wind very small, 1.33 by the scale. (8th,) Wind to-day occasionally from North.

The gutters, where any stagnant water left twelve hours after a rain, had gas bubbling up from below, turbid, discolored. (12th,) Rains *partial, in different* parts of city. (20th,) Rain to-day, accompanied with sharp blow from East.

Fogs in the neighborhood have been heavy every morning. The "clearness" of the sky, has greatly predominated during the "sunrise," and 9, P. M. observation, over those of 9 and 3 o'clock.

RECAPITULATION.

	Barometer.	Thermometer.	Dew Point.	Degree of dryness on the Thermometric Scale.	Degree of Moisture on the Hygrometric Scale, 1000 being sat.
Maximum,..............	30.29, on 1st, 11, 29,	91 on 20th,	79.4 on 19th,	18.3 on 20th,	0. or sat. 14 obs.
Minimum,..............	30.04 on 17th,	72 on 17th,	66.2 on 31st,	0. or sat., 14 obs.	.552 on 20th,
Average,..............	30.194	81.25	78.08	4.52	.873
Range,..............	.25	19.	13.2	18.3	.448
Average of daily range,...	....	9.46	3.35	....	....

ASPECT OF SKY.	
Average. At Sun Rise,..............	7.55
9, A. M..............	5.62
Midday,..............	3.45
9, P. M..............	7.75
Average of total,..............	6.34

QUANTITY OF RAIN

In inches and fractions,.......	7.016
No. of days on which Rain fell,	11
" nights " " "	0

WINDS. No. of days blowing,	Direction.	Force.
From the N.	2¼	1.33
" N. E.	4¼	2.11
" E.	9	1.88
" S. E.	1½	1.55
" S.	0¾	1.33
" S. W.	0	0.
" W.	5	1.20
" N. W.	1	1.75
No. of days calm,	17	
Average total, ...		1.33

HYGROMETRIC CALCULATIONS.

	At Sunrise.	At Midday.	At 9, P. M.	Average.
AMOUNT OF MOISTURE.				
	.950	.756	.915	.873
ELASTICITY OF THE VAPOR.				
	.897	.897	.931	.909
WEIGHT OF VAPOR IN A CUBIC FOOT IN GRAINS.				
	9.651	9.515	10.045	9.737

"E." Meteorological Register, for New Orleans, kept by E. H. Barton.

SEPTEMBER, 1853. LATITUDE, 30°. LONGITUDE, 90°.

Altitude of Thermometer above the Earth ... 5 feet.
do. of Rain Gauge ... 15 feet.
do. of Barometer above the sea, ... 11 ft 141

Explanation.

ASPECT OF SKY.—0 Represents entire cloudiness.
1 " a slight degree of clearness, and so on, until
10. " which represents entire clearness.

WINDS.—0 Signifying calm,
1 a very gentle breeze,
2 a gentle breeze,
3 a fresh breeze.
4 a strong wind.
5 a very do. do
6 a violent storm.

Day of Month.	Barometer at Sun Rise.	Barometer at 9 A.M.	Barometer at 3 P.M.	Barometer at 9 P.M.	Range.	Thermometer (outside, in open air, in shade, at) Sun Rise	Thermometer 9 A.M.	Thermometer 3 P.M.	Thermometer 9 P.M.	Average.	Range.
1	30.10	30.12	30.11	30.10	02	77	79	82	79	79	5
2	.08	.13	.10	.12	05	76	78	80	79	78	4
3	.13	.16	.11	.10	06	76	83	85	80	81	9
4	.05	.06	.03	.12	04	77	84	79	76	79	8
5	.05	.08	.06	.11	06	74	77	82	77	77	8
6	.10	.13	.08	.10	05	76	77	80	76	77	4
7	.11	.14	.08	.12	04	75	83	80	77	78	5
8	.14	.14	.10	.08	06	77	81	81	77	79	4
9	.07	.07	.02	.06	05	75	80	81	76	78	6
10	.10	.14	.12	.18	08	76	77	74	75	78	3
11	.18	.21	.20	.22	04	75	76	79	76	76	4
12	.21	.29	.24	.27	08	76	81	75	75	76	6
13	.24	.26	.18	.21	08	75	80	84	76	78	9
14	.16	.19	.14	.16	05	74	80	85	78	79	11
15	.17	.21	.16	.20	05	75	82	86	80	80	11
16	.22	.26	.22	.22	04	76	82	85	80	80	9
17	.24	.26	.21	.20	05	76	82	86	79	80	10
18	.20	.23	.15	.18	08	75	81	85	79	80	10
19	.17	.24	.18	.21	07	76	80	79	77	78	4
20	.24	.28	.24	.27	04	74	73	78	70	73	8
21	.24	.28	.21	.27	07	67	74	77	69	71	10
22	.28	.32	.23	.25	09	60	64	70	67	65	10
23	.27	.28	.25	.25	03	60	66	71	64	65	11
24	.25	.31	.25	.27	06	60	68	75	66	67	14
25	.27	.29	.26	.28	03	65	74	78	70	71	15
26	.30	.33	.31	.32	03	67	77	81	72	74	14
27	.31	.32	.28	.39	04	69	76	82	73	75	13
28	.27	.30	.23	.23	07	71	76	82	72	75	11
29	.21	.25	.22	.24	04	68	78	83	73	75	15
30	.23	.26	.22	.23	04	69	78	83	76	76	14
Totals, ...	90556	90651	90519	90577	159	2169	2328	2408	2168	..	263
Averages,	30.185	30.217	30.173	30.102	.05^{30}	72.30	77.60	80.26	74.76	..	8.76
Total do.	30.191					76.23					

Day of Month.	Aspect of Sky at Sun Rise.	9 A.M.	3 P.M.	9 P.M.	Anemometer, Course and Force of Wind at Sun Rise.	9 A.M.	3 P.M.	9 P.M.
1	0	0	0	10	N. 2	N.E. 2	E. 3	E. 2
2	0	0	0	8	N.E. 2	N.E. 3	N.E. 3	E. 3
3	10	8	0	10	E. 2	N.E. 2	S.E. 3	E. 1
4	1	8	0	8	0	N. 2	N. 4	E. 1
5	0	1	4	10	E. 1	S.E. 1	E. 2	E. 1
6	0	0	0	10	S.E. 2	S.E. 2	E. 2	E. 1
7	10	8	0	10	E. 1	E. 2	N.E. 3	E. 1
8	6	0	2	10	N.E. 2	N.E. 2	E. 2	E. 2
9	0	1	0	0	0	S.E. 1	E. 2	S.E. 1
10	0	6	0	0	0	N.E. 2	W. 1	N. 3
11	0	0	0	1	N.E. 2	0	W. 1	E. 1
12	0	0	0	0	E. 1	E. 2	S.E. 2	E. 2
13	1	0	9	10	E. 1	E. 2	E. 2	0
14	10	6	10	10	0	W. 2	W. 2	S.W. 2
15	10	9	10	10	0	S.W. 1	W. 1	N.W. 2
16	10	8	7	10	0	S.W. 1	E. 2	E. 1
17	10	8	2	10	0	S.E. 1	S.E. 2	E. 2
18	10	8	1	10	0	E. 1	E. 2	E. 2
19	1	0	0	0	E. 1	W. 1	E. 2	0
20	0	0	0	0	N. 3	N. 3	N.E. 3	N.E. 1
21	2	10	1	10	N.E. 1	N. 3	N. 3	N. 3
22	10	10	10	10	N. 3	N. 3	N. 3	N. 3
23	10	10	10	10	N. 4	E. 2	N.E. 3	W. 1
24	10	10	10	10	N.E. 2	E. 2	N.E. 2	N. 1
25	10	10	10	10	N.E. 1	E. 3	E. 2	E. 1
26	10	10	7	10	E. 3	E. 3	E. 3	E. 1
27	10	10	10	10	N.E. 2	E. 2	E. 3	E. 1
28	10	10	3	10	N.E. 1	N. 3	E. 3	E. 1
29	10	10	10	10	0	N. 2	E. 2	E. 1
30	10	10	2	0	N.E. 1	E. 3	E. 3	E. 2
Totals, ...	171	169	118	227	N. 4¼	N.E. 5	E. 12¾	S.E. 2¼ calm, 3
Direction.					S. 0	S.W. 0¾	W. 1¾	N.W. 0¼
Averages,	5.70	5.63	3.93	7.56				
Force.					N. 2.52	N.E. 2.05	E. 1.56	S.E. 1.66
Force.					S. 0	S.W. 1.33	W. 1.28	N.W. 2
Total	5.70				1.62			

PSYCROMETER. Temperature of Evaporation & Dew Point.

Day of Month.	At Sun Rise: Temperature of Evaporation.	At Sun Rise: Dew Point.	At 3 P.M.: Temperature of Evaporation.	At 3 P.M.: Dew Point.	At 9 P.M.: Temperature of Evaporation.	At 9 P.M.: Dew Point.	Range.	Average Daily Humidity.
1	74	72.8	76	73.9	76	75.0	2.2	.843
2	74	74.6	77	76.0	77	76.3	1.7	.899
3	75	74.6	77	74.4	78	77.3	2.9	.851
4	76	75.6	73	70.7	75	74.6	4.9	.888
5	74	74.0	77	75.3	75	74.2	1.5	.905
6	75	74.5	77	76.6	75	74.5	2.1	.931
7	75	75.0	77	76.6	77	77.0	2.0	.974
8	76	75.6	79	78.3	76	75.6	2.7	.944
9	75	75.0	78	77.0	76	76.0	2.0	.959
10	75	74.5	74	74.0	75	75.0	1.0	.988
11	74	73.6	77	76.3	76	76.0	2.7	.958
12	74	74.6	75	75.0	74	73.1	1.9	.962
13	75	75.0	77	74.7	75	74.5	0.5	.890
14	74	74.0	77	74.4	77	76.8	2.8	.881
15	74	73.6	77	74.1	78	77.8	4.2	.848
16	75	74.6	77	74.4	78	77.3	2.9	.857
17	76	76.0	78	75.5	77	76.3	0.8	.871
18	75	75.0	77	74.4	77	76.3	1.9	.870
19	75	74.8	75	73.5	75	74.2	1.3	.900
20	73	72.6	67	61.6	68	67.0	11.0	.797
21	65	63.8	67	62.1	62	57.5	6.3	.880
22	56	52.4	61	55.0	61	56.9	4.5	.705
23	53	50.3	59	50.3	62	60.6	10.3	.689
24	59	57.4	65	59.5	65	64.4	7.0	.800
25	63	61.7	68	63.3	67	65.4	3.7	.782
26	63	60.5	74	71.4	76	69.1	10.9	.803
27	67	66.0	73	69.6	71	70.1	4.1	.815
28	70	69.5	71	66.5	70	69.1	7.0	.804
29	67	66.4	71	66.1	70	65.4	1.0	.755
30	68	67.4	75	72.2	74	73.2	5.8	.847
Totals, ...	2127	21054	2206	21227	2187	21566	1134	....
Averages, ...	70.90	70.18	73.53	70.75	72.90	71.86	3.78	....
Total Averages, ...	....	....	....	70.93	....	....	....	....
Drying power, ...	....	2.12	....	9.51	....	2.90	....	....
Average do. ...	....	....	....	4.84	....	....	....	....
Average temp. of Evaporation,	....	....	....	72.44	....	....	....	....

RADIANT THERMOMETER IN SUN, AT

Day of Month.	Sun Rise.	9, A.M.	12, M.	3, P.M.	9, P.M.
1	77	....	....	....	....
2	75	....	....	....	79
3	75	109	120	....	78
4	77	114	124	....	....
5	74	112	....	106	....
6	76	....	....	....	75
7	75	106	....	....	77
8	77	....	....	105	77
9	75	104	....	....	....
10	75	....	....	....	75
11	75	....	....	....	76
12	76	....	....	....	75
13	75	....	114	118	76
14	74	100	114	114	78
15	75	111	114	114	80
16	76	100	111	112	80
17	76	114	114	113	79
18	75	113	118	....	79
19	....	....	....	....	77
20	....	....	....	....	70
21	67	99	105	....	69
22	59	84	88	88	67
23	59½	99	90	104	64
24	61	96	86	102	66
25	69½	97	104	106	70
26	67	97	101	95	72
27	69	97	104	113	73
28	70	103	106	....	72
29	67	100	110	113	73
30	68	98	98	....	76
Totals, ...	2158	2070	1921	1508	1857
Avr. exposed	71.66	103.	106.72	107.71	74.28
Avr. in shade	72.30	77.30	80.94	79.92	76.40
Difference, or radiation	0.64	25.70	25.78	27.97	2.12

PLUVIOMETER;—RAIN.

Date.	Began.	Ended.	Quantity.
1..	4. A.M.	5. A.M. ...	.250
2	5. A.M. 10.30 A.M.	8. A.M. 2.30 P.M.	.025 .100
4..	2.50 P.M.	3.45 P.M. ...	1.450
5	5.30 A.M.—showers, 12.30 P.M.	12.50	.150
6..	Showers at 11 & 3 ...		.220
7	3.30 P.M. Showers	4. P.M.	.080
8	In night .... showers to 2 P.M.		.200
9	In night .... Showers to 1 P.M. ...		.060 .100
10	Showers to 12 M. ... do. to 5 P.M. ...		.680
11..	Occasional showers ...		.100
12	12.30 P.M. 4. P.M.—showers,	3.29 P.M.	.800
13..	4.5 P.M.	4.55 P.M. ...	.600
20	Showers light in night		.050
21..	7. A.M.	9. A.M. ...	.130
	....		5.045

Day of Month.	Daily Mortality from Yellow Fever.	Ditto from other Diseases.	Total Daily Mortality.	Height of River *below* High Water Mark, which is usually about Fifteen Feet.
1	105	28	133	
2	90	26	116	
3	91	19	110	
4	71	27	98	
5	66	29	95	
6	49	21	70	
7	49	12	61	
8	44	20	64	12 ft.
9	57	23	80	
10	44	24	68	
11	35	20	55	
12	26	21	47	
13	33	12	45	
14	32	20	52	
15	31	20	51	
16	24	23	47	
17	29	18	47	12 ft. 8 in.
18	21	13	34	
19	29	20	49	
20	15	22	37	
21	17	17	34	
22	11	17	38	
23	10	24	34	
24	15	20	35	12 ft. 6 in.
25	17	23	40	
26	12	21	33	
27	12	17	29	
28	11	24	35	
29	9	7	16	
30	11	20	39	11 ft. 6 in.
Totals	1066	608	1694	....

REMARKS.

The *occurrence of* thunder and lightning continued as long as the rains.

The North winds, and cool dry weather, occurred soon after the middle of the month, greatly abating the epidemic.

RECAPITULATION.

	Barometer.	Thermometer.	Dew Point.	Degree of dryness on the Thermometric Scale.	Degree of Moisture on the Hygrometric Scale, 1000 being sat.
Maximum, ...	30.33 on 26th,	86 on 15th, 17th,	78.3 on 8th,	20.7 on 23d,	0. or sat. 14 obs.
Minimum, ...	30.02 on 9th,	60.22 on 22–'3d,	50.3 on 23d,	0. or sat., 14 obs.	.502 on 23d.
Average, ...	30.191	76.23	70.93	4.84	.857
Range, ...	.31	26.	28.	20.7	.498
Average of daily range, ...	.05^{30}	8.76	3.78	....	....

ASPECT OF SKY.

Average		
	At Sun Rise, ...	5.70
	9, A. M. ...	5.63
	Midday, ...	3.93
	9, P. M. ...	7.56
Average of total, ...		5.70

QUANTITY OF RAIN

In inches and fractions, ... 5.045
No. of days on which Rain fell, 14
" nights " " " 3

WINDS.

No. of days blowing,

		Direction.	Force.
From the	N.	4¼	2.82
"	N. E.	5	2.05
"	E.	12¾	1.86
"	S. E.	2¼	1.66
"	S.	0	0.
"	S. W.	0¾	1.33
"	W.	1¾	1.28
"	N. W.	0¼	2.00
No. of days calm,		3	
Average total, ...			1.62

HYGROMETRIC CALCULATIONS.

	At Sunrise.	At Midday.	At 9, P. M.	Average.
AMOUNT OF MOISTURE.	.932	.732	.908	.857
ELASTICITY OF THE VAPOR.	.775	.782	.816	.781
WEIGHT OF VAPOR IN A CUBIC FOOT IN GRAINS.	8.402	8.473	8.828	8.567

ratory of nature; if they are hidden from us to-day, their application may be made by our successors to-morrow. We can no longer plead ignorance of their practical bearing and importance; but, we are, as yet, upon the mere shores of meteorological science, "picking up the few pebbles" of truth that have been yielded to perseverance and industry, while the boundless ocean lies open before us, for exploration and discovery.

SECTION VII.

THE SECOND CONSTITUENT OF AN EPIDEMIC.—THE TERRENE.

Proposition—The Upturning of the Original Soil, together with Filth of all Kinds—The sine qua non of all our Epidemics—Proofs as far back as Sixty Years, to the Present Period—How first noticed by me—Causes of Epidemics at Natchez, Memphis, St. Francisville, Mobile, Selma, Algiers, &c., &c.—For an Endemic less necessary—For Bilious and Periodic Fevers still less, but all the same!—Why Yellow Fever does not always extend—We Know as much of the Origin of Yellow Fever as we do of any other Fever—All Countries have their Peculiar Diseases—Parallel of Yellow Fever and Plague—Extension of the Epidemic due to late Inundations in Part—At what Stage, Swamps most Dangerous—Proofs from Foreign Countries and here—Different Stages of Draining Produce Different Diseases—How and When to Drain Land, &c.

The other blade of the "shears."

Our other constituent to produce the yellow fever epidemic, the other blade of the "shears," is the TERRENE. This is very comprehensive, and embraces all foul, filthy, organic matter passing through its decomposition, whether terrene, miasm, malaria, or what not. *Every thing terrene* that is injurious to health may be so denominated. I wish to be distinctly understood here, that neither meteorological nor terrene causes alone, is sufficient to produce the effects alluded to, and hence the great difficulty and stumbling block, when one of these is found present, even in an aggravated degree, and not the other, and the effects do not ensue.*

Epidemic yellow fever then depends upon two circumstances: first, a *meteorological*, and secondly a *terrene cause.* The *precise amount*, or constituents, of which each of these consists in their original or proximate elements, the present state of science has not yet informed us of. Of the first, I have shown the main ingredients; of the second, it is probably composed of all decomposed or decomposable matter. The varieties of fever, most probably, depend upon variable amounts of these constituents, influenced by the physiological condition of the individual, which only slightly varies the extreme force of the causes producing an epidemic. I have expressed the opinion that an *epidemic* yellow fever proceeds from a *general* distemperature of the air with local influences, and particularly with an undue disturbance of the original soil. I shall show presently that an *endemic* yellow fever depends upon a more local distemperature, with the same local influences, but in a minor degree, and that the type or malignancy depends upon the more or less extent of these causes, and finally, that *bilious or periodic fevers* depend for their existence upon the *same causes*, but in a *much* diminished degree.

From whence varieties of fever.

To apply the same principles in examining into the causes of yellow fever as of other fevers.

In examining into the cause or origin of our epidemic yellow fevers, there is no reason why we should not apply the same principles, as in initiating the cause or origin of other fevers, or other diseases. If we cannot say that we have the very precise and exact meteorological data, or the precise amount of decomposable matter, we are just as near the *truth as we are in looking into the causation of any other disease.* Overpowered by the magnitude of the disease, and bending before the authority of great names, we suffer ourselves to be blinded to the plainest facts. It is considered by some, as an act of temerity or folly, to dare to think of preventing it; that

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*This, it seems to me, will explain most of the difficulties that have set them by the ears in Charleston, in relation to the occurrencces of last year, and why they *did not have the fever there*, "the *meteorological* cause" was said to be present, the other was not: the "Jacksonism" of the Mayor did not consist "in removing the two cases" that occurred, but in his praiseworthy energy in keeping the city *thoroughly clean*, in preventing the concurrence of the second, and equally essential cause, (now, the causa sine qua non.) It is a great pity some more Southern cities had not been blessed with a little of that wholesome "Jackson" energy, and common sense of duty, instead of being contented in boasting of the existence of "cleanliness" and "health!"

such ordinary things as heat, moisture, filth, and such like trifles, however combined, could give rise to this great monarch of disease, (y. f.) is but playing with human credulity! They forget, all the while, that a sudden change of temperature alone, has often deprived human beings of life, in a few hours; that vitiated air has, still oftener, killed in much less time, and that nearly all disease to which man is subject, is caused by conditions not widely different, or so minute as to defy the utmost power of detection. It is time to put aside and be done with all this stultifying and misleading mystery and awe, and boldly facing, and defying, all carping misgivings, push our scrutinies as far into the causes as our facts and reasonings will legitimately carry us.

1st proposition.

Cause of every epidemic.

Proposition 1st; now, if we can prove that the EPIDEMIC YELLOW FEVER has *never occurred here* but in a *certain condition of things* in so long a period as sixty years, that *it has always occurred* here *when this condition was present*, and that it *has occurred* in at least three other places under similar conditions, so far as can be ascertained, of between twenty and thirty years each—then there is a *fair presumption*, if *not more* that *we have arrived at one source of its causation.*

2d do.

Cause of our endemics.

Proposition 2d; if we can prove that our ordinary ENDEMIC *yellow fever*, occurs here and elsewhere, under certain contingencies of a high temperature, for a certain time, with a combination of much moisture and filth, that *these are never known to be absent when it does occur*, that it has occurred under circumstances, where no foreign origin could *possibly* be imputed to it, that if there should be apparent exceptions, viz: that it does not always occur where these are *all apparently present*, is it not fair to presume this to happen, rather from some defect in our observations, (and we well know how imperfectly and under what prejudices and defective knowledge these are often made) than from any deficiency in the constituents themselves, or than an occult cause? Can we not then, with all reasonable presumption infer, that the above are really the causes of yellow fever? If we prove that when these are removed, that it does not occur, is there not another proof of the sufficiency of the cause, especially for all practical purposes? And is it not at war with one of the first rules of philosophising to hunt up

3d do. Cause of our bilious fevers.

extraneous causes, to account for that of whose origin we *have sufficient* proof? and the 3d proposition is, that these causes existing in a less degree, will *produce bilious and periodic fevers.*

Of the first proposition.

Proof.

With regard to the first proposition, I wish to be understood distinctly as stating, that *since* 1796–'7 *to the present time there has been no great epidemic yellow fever in this city, without an extensive breaking up—disturbance and exposure of the original soil of the country;* that this has consisted in digging canals and basins or cleaning them out, either in the city or its immediate neighborhood, digging and excavating the streets of the city for the purpose of laying down gas and water pipes, and relaying the streets—digging and embanking for railroads and similar purposes, in the summer season, and relyingly—refer to the Chart A, for full and conclusive proof thereof; and that the *extent and malignancy of the disease, has been pretty much in proportion to the extent of these exposures.*

Succinct origin of all our epidemics.

Of 1797.

The first epidemic yellow fever that is recorded here, is that simultaneous with excavating the earth, in digging the Canal Carondelet, and more especially its basin in 1797. I am informed by a highly intelligent and observing creole gentleman, that the fevers during the period of digging this canal were awful in its neighborhood, even with Creoles;—and that last year the sickness in the vicinity of the excavation of its new basin was very extensive, although there were few but natives and acclimated exposed to it.

1811.
1817.
1819.
1822.

The next most extensive yellow fever epidemic occurred during the cleaning out the same canal in 1811. Then we have the next severe epidemics of 1817–'19–'22, simultaneous with extensive exposures in the streets for pavements—large fillings up and enclosures of the batture, and the cleaning out and deepening the same canal.

1832–'33.
and 1837.

Then follows the great mortality of the epidemics of 1832–'3, the largest we have ever had in this country, resulting from the immense exposures of the swampy soil in digging the Bank Canal from the city to the lake. Then follows the epidemic fever of 1837, resulting from digging the extensive trenches and canals, to drain the rear of the First and Second Districts

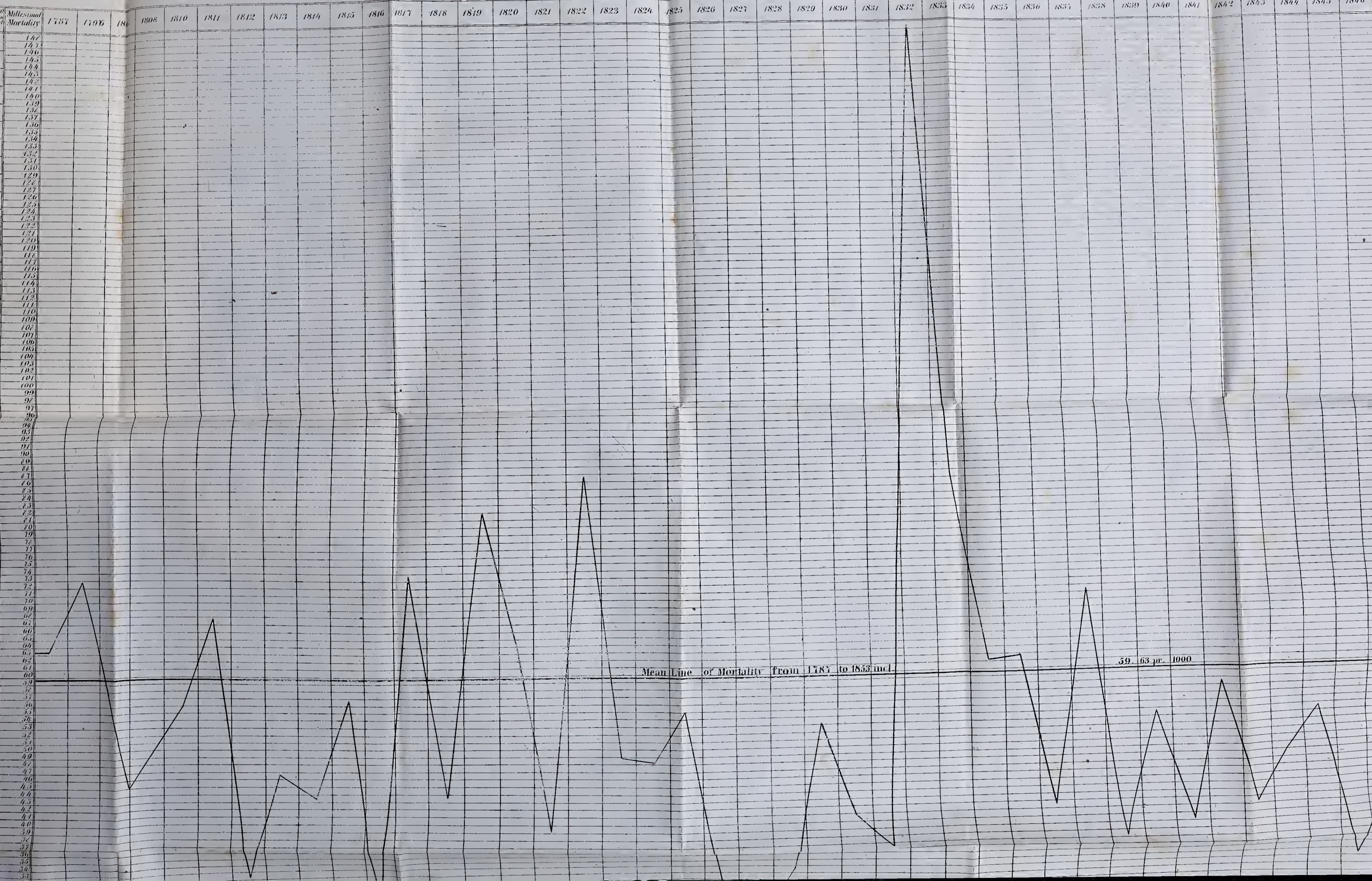
CHART EXHIBITING THE ANNUAL MORTALITY OF NEW ORLEANS,

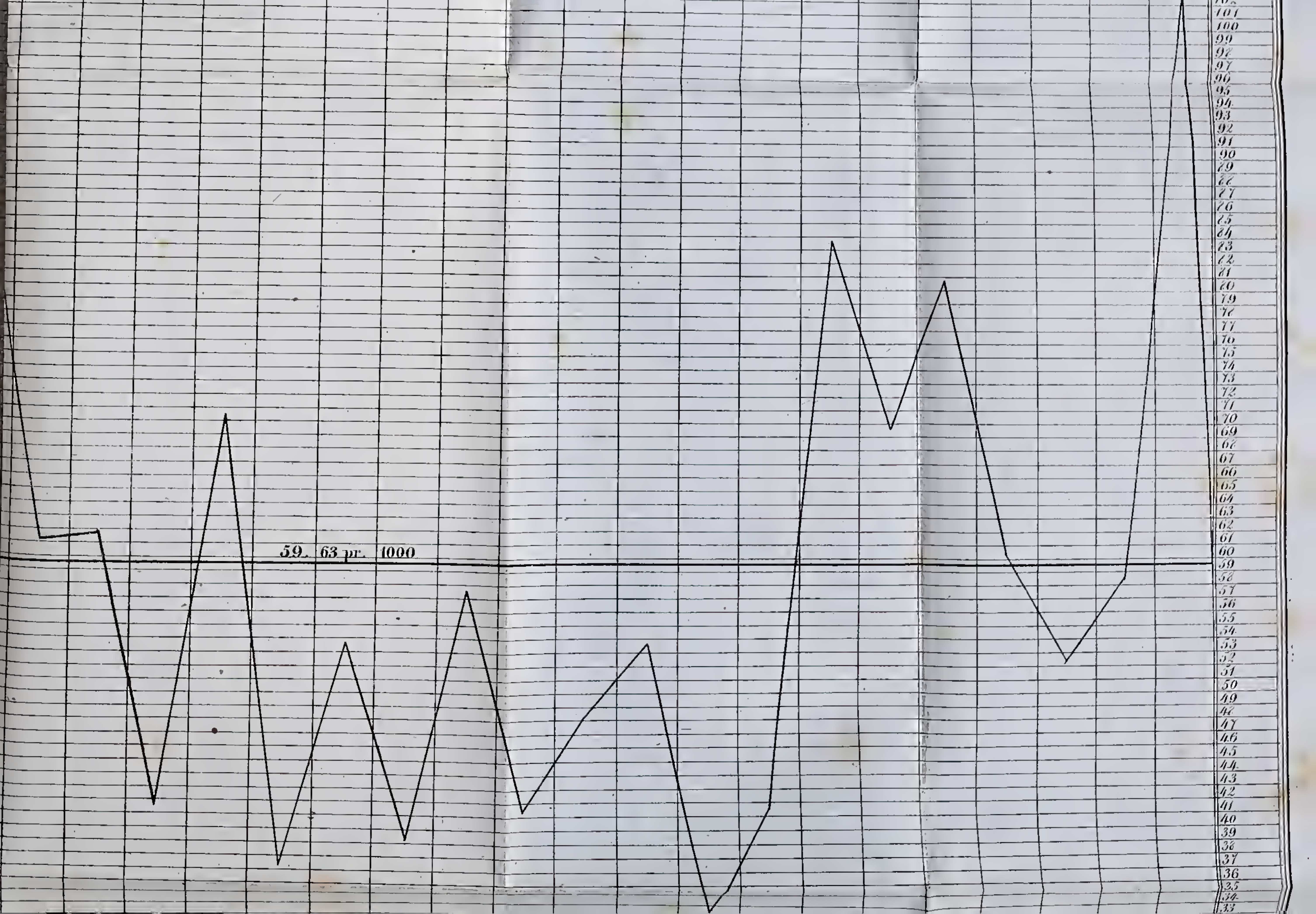
per 1000 of its Population for each Year: together with the causes influencing or producing it, from 1787 (with a few exceptions) to 1854.

Illustrating the Report on the Sanitary Condition of New Orleans

by **E. H. BARTON, A.M. M.D.**

Year	Population	Total Mortality	Ratio pr. 1000 of Population or Millesimal Mortality
1787	5.284	338	63.92
1796	8.756	638	72.86
1807	17,001		
1808	July to July 17,081	773	45.25
1810	17,242	963	55.85
1811	18.233	1,239	67.94
1812	19,229	624	32.24
1813	20.222	939	46.44
1814	21,216	926	43.64
1815	22.209	1,252	56.37
1816	23,303	651	27.89
1817	24,196	1,772	73.22
1818	25,190	1,106	43.90
1819	26,183	2,138	81.65
1820	27,176	1,766	64.08
1821	29,441	1,165	39.29
1822	31,706	2,754	86.86
1823	33,971	1,662	48.92
1824	36,236	1,748	48.23
1825	38,501	2,117	54.98
1826	40,766	1,248	30.61
1827	43,031	1,057	24.56
1828	45,296	1,490	32.89
1829	47,561	2,520	52.98
1830	49,826	2,022	40.58
1831	52,455	1,926	36.71
1832	55,084	8,099	147.02
1833	57,713	4,976	86.21
1834	60,342	3.687	61.10
1835	62,971	3,875	61.53
1836	65,600	2,734	41.66
1837	68,229	4,807	70.45
1838	70,858	2,606	36.77
1839	73.487	3.934	53.53
1840	76,116	2.977	39.11
1841	78.745	4,549	57.16
1842	81.374	3.375	41.47
1843	84,003	4,050	48.21
1844	86.632	4.620	53.32
1845	89.261	2.983	33.41
Including Lafayette 1846	102,070	4.220	41.34
1847	108.699	9.043	83.11
1848	115.503	8,026	69.48
1849	122.514	9.862	80.49
1850	129.747	7.819	60.26
1851	138.599	7.275	52.48
1852	147.441	8.670	58.80
1853	154.132	15.787	102.42

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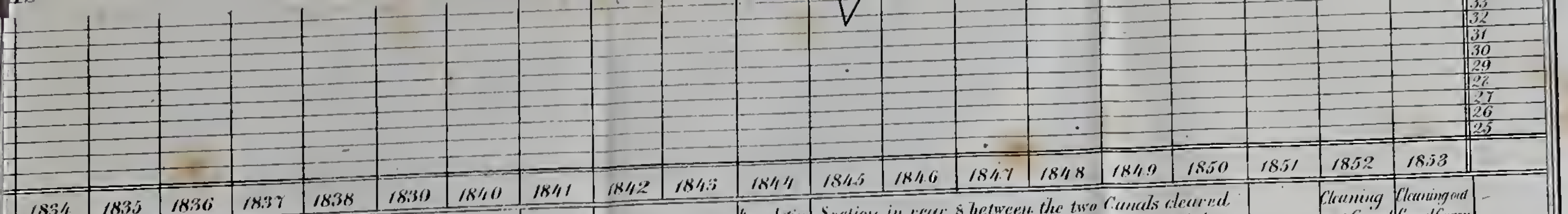


ed to the Lake

ng to pave season.

pt

1836: Drained the rear of 2nd District.

1837: Trenches prepared to drain the rear of the 1st balance of 2nd District & drained

Foundation

1841: Draining Co. continue their operation & clearing

1844: Foundation to Burgundy street

1845–1849: Section in rear & between the two Canals cleared, drained & deeply & extensively tunnelled, earth left exposed & without regard to season.

War Population increased

Foundation to Carondelet st. in May

Heavy rains

Melpomene canal cleaned out &c

Oct. to Sept. following Immense excavations 2 acres, 20 by 7 ft wide & 7 ft. deep for foundation of Customhouse.

1852: Cleaning out Canal Claiborne in August

1853: Cleaning out Canal Carondelet, digging its new basin

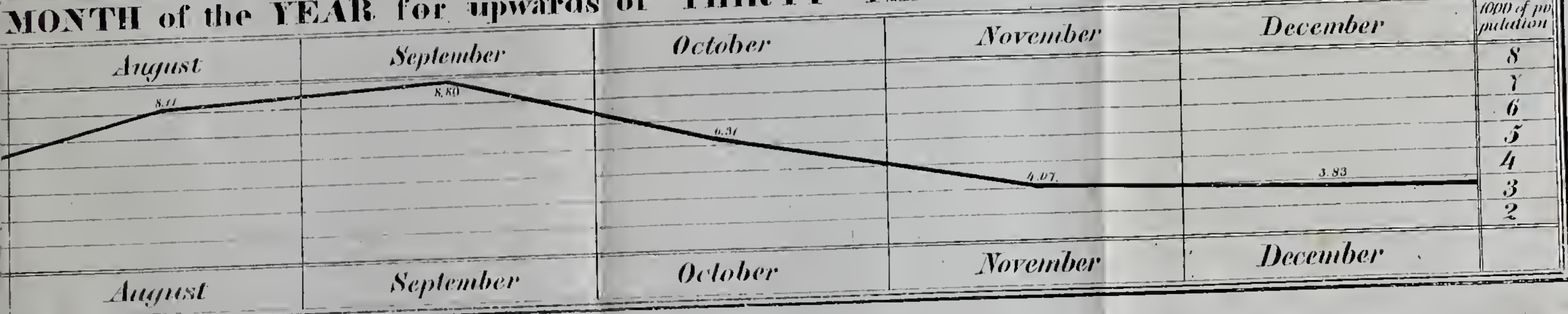
Widening Canal of B.

Digging for Railroads

Digging in streets for water & gas

Heavy Rains &c &c

MONTH of the YEAR for upwards of THIRTY YEARS.



Illustrating the Report on the Sanitary Condition of New Orleans

1852	145,441	8,670	58.80
1853	154,132	15,787	102.42

EXPLANATION.

The elevations in the perpendicular columns, for each year, indicate the ***Amount of Mortality*** *as shewn by the Scales on the right and left, on a level with the horizontal lines.*

36
35
34
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25
1787
1796
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1847
1785-9-99 Crevasses above affecting the City
1794 97 Canal Carondelet dug
1797 The Basin dug Trenches dug around the City & Swamp exposed
The First yellow Fever 1796.
Canal Carondelet cleaned out
Hurricane damaging the City much.
War.
Population &c greatly increased
Crevasse
Extensive digging for Pavements
Large enclosures of the Batture
Canal Carondelet & Bayou St. John clearedout & completed..
Wooden Sidewalks removed
Foundation to Baronne Street in autumn
The Canal Carondelet deepened & cleaned out
Great rains Much earth brought in to fill up the streets preparatory to paving & to build
Extensive disturbance of the Soil to pave the Streets
Gormleys basin and Canal prepared to drain upper & back part of the City
Melpomene bayou or canal adapted and prepared as a city drain.
Foundation to Dauphin Str. in the autumn
Extensive digging the basin of the Bank Canal
Canal extended to the Lake
Extensive digging to pave regardless of season.
Heavy Rains
'33 June Sept
Drained the rear of 2nd District
Trenches prepared to drain the rear of the 1st balance of 2nd District & drained
Foundation
Draining Co continue their operation & clearing
Foundation to Burgundy street
Section in rear & betw
drained & deeply & exte
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EXPLANATION.

The elevations here under each month indicate upon an average of a long series of years, the ***Monthly Mortality****, and of course, the monthly liability during the year.*

PROPORTIONAL RATIOS of MORTALITY per each 1000 of the POPULATION in each MONTH of the YEAR for upwards of THIRTY YEARS

1846-'48.

1848-'49 &c., and its consequences.

The next largest mortality, and which has continued ever since, arose from the large *new canals and clearing* and exposure of the soil, between the two Canals, in rear of these districts, without regard to season, and the immense excavation of two acres of ground and with the removal of upwards of 336,000 cubic feet of earth for the foundation of the new Custom-House, in the heart of the city—beginning the latter part of October, 1848, and ending in the succeeding August, *during which period* we had a severe epidemic of cholera with a mortality of upwards of 3,600, and during the balance of the year of 243—with a loss by yellow fever of 769. During the succeeding year (1850,) the mortality from cholera was 1,448, and in '51 of 645, and in '52 of 1,326, with the addition of 597 deaths from yellow fever during these three years, for effect of all which refer to chart A.

The specia causes for the epidemic of 1853.

And, finally, which has contributed so much to produce the great calamity of last year (and on which mainly I founded my prediction of the fever in the preceding May)* was the extensive exposures of the earth in making a new basin for the same canal (Caroudelet)—clearing out the canal—dredging the Bank Canal—extensive exposures of the earth in deepening the ditches between Conti and Common streets, and also in the rear of the third district, the digging and exposure for the erection of a levee between the two canals on Lake Pontchartrain—the large excavations on miles of streets in the centre and front of the city—for laying down gas and water pipes and making and relaying pavements—as exhibited in black lines on the Sanitary map—the extensive exposures for laying the foundation of new buildings (especially on Front street,) and the excavations and exposures for railroad purposes in the rear of the first and fourth districts and at Algiers. Here then we have a combination of materials of exposure of the original soil unprecedented in our annals, probably excepting that of 1832,* which was more concentrated, and the *consequences* have been correspondently destructive, in combination with meteorological conditions (before expressed) in proof of which this mortality *continued large as long as this exposure continued*, no doubt influencing the two epidemics of 1833, of cholera and yellow fever, and causing the large mortality of the two succeeding years (see Chart A,) and *every large mortality since.*

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* See published "transactions" (of that date. page 10) "of the New Orleans Academy of Sciences," for the details of this prediction

Is it any more unreasonable for us to predict the occurrence of disease, occurring under precedent well known conditions, than that nearly all inferior creation should have the power of foretelling future events that are essential to their safety The *instincts* of the spider—the tree frog—birds so announce to them, hours and days beforehand, a coming change in weather; the Beaver—the Bee, &c, have the power of foreseeing *months* beforehand, floods, droughts or other inclemencies of the weather, that would otherwise be absolutely fatal to their existence. Surely, this can only be derived through meteorology proceeding from a sensitiveness or means. far beyond what we at present possess If a greater difficulty is experienced with us, the cause may be found, besides in that of the imperfection of our meteorological instruments—that disease is the *result* of a *two-fold condition*—a meteorological, and local or personal one, and that, as yet, observation of the influence of this combination on the human body is too limited for general knowledge With more industry in collecting and recording facts, the time may not be distant when success shall more frequently crown our efforts.

Cholera and yellow fever highest grades of zymotic diseases.

Exposure of earth with heat and moisture worst combination.

The first proposition then, is believed to be fully sustained. Looking upon the epidemics of cholera and yellow fever as the highest of the zymotic class, (of what is called malarial disease,) requiring for their existence a great accumulation and concentration of their respective causes; the one being a disease of the cool, and the other of the hot months; and believing that an extensive exposure of fresh earth, when conjoined with filth, crowding, &c., with the meteorological causes which in the union of high temperature and great humidity have been always present, form the worst combination, the occurrence of these diseases during the period referred to are fully accounted for, and amply affirm the correctness of our first proposition.

How they were first made known.

No effect without an adequate cause.

These curious and remarkable developments occurred to me in the course of my statistical investigations and scrutinies into the *causes* of the mortality of this city, in which I have felt a deep interest for very many years. After constructing the upper part of chart A, the immense discrepancy in the mortality of the several years immediately attracted my attention, and as there could be no effect in the physical world, without an adequate corresponding cause, and as it so much exceeded that of the rural districts around us, all the changes in the physical condition of the city and neighborhood were carefully investigated and placed to their proper date, under the mortality of each year respectively. The subject became interesting as I proceeded; its valuable bearing soon became apparent; a clue was evidently found to the causes of our fatal epidemics; and finally, it was clearly demonstrated by the facts collected and exhibited on the chart—in the language of the proposition—that "there has been no great epidemic yellow fever in this city, without an extensive disturbance of the original soil of the country," and this, I think, has been fully proved, There is no other to which to attribute it; no other great change either *in* the earth or *above* the earth, so far as my meteorological observations have extended, (and my investigations in this line have reached as far back as any records could possibly be procured,) and for many years back they have been made by me with great care and minuteness, in order to throw some light on this curious and important, and to us, vital subject. It has been too constant and invariable for a mere coincidence, and can be viewed by the philosophic mind in no other way than as cause and effect.*

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* The greatest mortality was by *Asiatic cholera* that year.

Too invariable for a mere coincidence.

More fully to satisfy my mind in relation to the important bearings of this subject, more especially, since the appointment of the Sanitary Commission, to investigate the origin of our late great epidemic, I determined to extend my inquiries to other places, and see if similar facts and analogous results were recorded elsewhere. Accordingly, the corroboration has been most remarkable, leaving not a remnant of doubt on the mind, as to the fact or the consequence.

Prof. Merrill, (formerly of Natchez, and now of Memphis,) has clearly traced the successive epidemic yellow fevers that have in a series of years devastated Natchez, to the cutting-down, leveling and filling up the streets. "This city," says he, "is built upon a bluff; in 1816, the city authorities began to put into operation a plan for reducing the irregular superficies to what was considered a more suitable grade. During all that year a large amount of work was done, digging down and filling up streets and lots, without due regard to the maintenance of a proper drainage. The succeeding autumn the *first epidemic yellow fever* occurred, and produced a frightful amount of mortality. As soon as the shock of the epidemic had partially subsided the work of grading was resumed. No one could perceive why it should be considered the cause of the disease, and the work went on, with a recurrence of the epidemic visitation every second year, until, the population having been several times decimated by death, and business and property greatly declined, the city found itself scarcely able to continue the improvements, and scarcely worth them if made. After the dreadful visitation in 1823, the work gradually declined, and the subsequent return of the disease declined in violence and fatality *pari passu*, until the last of the series, in 1829."

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* It is due to myself to say that there may be various errors in the materials of which this Chart has been constructed, in a country where there are scarcely any records (official) of anything relating to the vital statistics of the country (of births, deaths and marriages) The data are to be obtained at great cost of time and trouble, from sparse and occasional sources. The materials to construct this Chart have expended much of these before even their chief value was apparent, by applying them to each other They will, I trust, serve the basis of an instructive future, if we are to be instructed by any lesson derived from the past. I have taken great pains to make them as correct as my materials would allow, and do not think it contains material errors It would seem as if our object was to avoid records, to destroy the frightful facts they expose It is very true we *should be ashamed of them*, but then the humane and honest way would be to *correct* not *conceal* the truth. About four, times have we had short-lived "Boards of Health," (that is, Boards of *Record*—for they have had little other power) since 1811, and so far as their records have been published, so well: otherwise, it is *nobody's business to take care of valuable city records!* and this report has thus been much detained from the public from that cause.

Proofs of the cause of each of the epidemics at Natchez.

"Soon afterwards a new era commenced. Exuberant prosperity overspread the land. A new population was brought into the city, and in 1834–'5–'6 the grading was resumed to some extent. The doctrine of domestic origin and artificial causes had again lost ground. The voice of experience was not heard or overruled, and the penalty again suffered. Many of the older inhabitants foresaw the result in fear and trembling, and the epidemics of 1837 and '9 sent many to their untimely graves. The eyes of the living were again opened to see their danger, and its causes, and since that time little grading has been done."

"Now that these experiments did render Natchez sickly, there can be no reason to doubt. The coincidences were too striking to be viewed as accidental. Besides, the same effects following the same causes, have been observed elsewhere. Private residences and plantation negro quarters have suffered in the same way; also workmen on railroads and canals—upon levees and upon city wharves and landings, as well as persons residing in the neighborhood of such works."

And again, notwithstanding previous warnings—in 1853, at Natchez, the levelling the streets by the cutting down the adjoining banks, and superposing the fresh earth on the streets resulted in the fever. It is said to have first broken out in the immediate neighborhood where this took place—that here occurred its largest mortality, and thence it spread to the neighborhood.

Do. of Memphis.

The same gentleman has most satisfactorily ascribed the insalubrity of MEMPHIS, to the same cause, and the same effects have followed similar causes in the rural and otherwise healthy districts, on the blacks as well as on the whites.

Do. at St. Francisville and Bayou Sara.

The severe epidemic yellow fevers at *St. Francisville*, in 1827 and 1829, were to be clearly debited to the cutting down the hills, spreading the materials on the streets and grading them, digging cellars, &c., during the summers of those years, (from personal recollection) and the epidemic of 1839, at *Bayou Sara*, was equally due to the filling up, by spreading fresh earth over brushwood, and filling up low places.* And for the *only other epidemic* known to have occurred there, since its settlement, that of 1853, may with much propriety be ascribed to parts of a levee made and ditches dug—acres of saw-dust from a saw mill spread and low places filled with it, and for years previous, working extensively on the streets just previous to the epidemic, and extensive swamp leveed off and dried up in the vicinity.†

Do. at Lake Providence.

At *Lake Providence*, the decay from the extensive spreading of saw-dust over the streets and filling of lots, producing a very offensive odor; unusually low water; extensive exposure of river bank.‡

Fort Adams.

At *Fort Adams*, extensive exposures of the earth from large cavings in of the river bank.||

Centreville.

At *Centreville*, extensive ditching and stirring up of mud in the principal streets or roads of the village—"past summer unusually wet, and heat of the sun very great."§

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* As stated to me by my friend Dr. J. W. Bell. † Dr Brown. ‡ Judge Selby
|| Dr. Benedict. § Dr. Wood.

Clinton.

At *Clinton*, working the streets, and unusual disturbances of the soil and of back yards during August and September, and to the middle of October.*

Trenton.

At *Trenton*, on the Ouachita, soil greatly disturbed by the "*improvement*" of the streets; soil brought from a distance and spread on the main street; several excavations made for new cisterns in May and June; marshes and pools near the town.†

On the La Fourche.

Dr. Kitridge informed us that the fever on his own place—in the interior, *on Lafourche*, arose, most palpably, from spreading over his large yard, fresh earth from his neighborhood, not a case of the fever then existing within fifty miles of him.

Natchitoches.

At *Natchitoches*, ditches of the town cleaned out in August, and a great deal of disturbance of soil, to lay down pavements in July and August.‡

Algiers.

In *Algiers*, on the opposite side of the river, during the last season, extensive embankments of earth and excavations were made for the Opelousas Railroad, the fever broke out and devastated that village; of 350 hands employed on the road, 300 fell victims to it.

On the Jackson street railroad extending from this city, I am informed fifty hands out of eighty died of it.

Of the amount of mortality on *the Great Northern Railroad* I am not so well informed—their sick being brought into the city when attacked. But the tracing the fever along the lines of these roads will be found in a subsequent part of this Report.||

So far for its influence in this state, let us extend our inquiries to the neighboring State of Alabama.

Do. at Mobile.

Dr. Levert of *Mobile*, has most satisfactorily traced *every epidemic yellow fever*, that *has afflicted our sister city* for *upwards of twenty-eight years*, to *similar disturbances of the soil.* So convinced had the authorities become of its injurious influence, that a city ordinance had been passed, forbidding it during the summer, which was most unfortunately rescinded last spring, and the disturbance had again taken place to a greater extent than ever—to accommodate the railroad, and to fill up some low lots, and the consequence have been chronicled in a corresponding calamity. I refer, with great pleasure to his valuable report among our proceedings.

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* F. B. Harvey. † See testimony. ‡ Dr. Crocheron. || Same informed 50 per cent. of the hands died.

At Selma.

At *Selma*, the occurrence of the epidemic of last season, has been most satisfactorily accounted for, in a similar manner. "To the removal of old deposits, exhumations, the filling up of a hollow, various deep and extensive excavations for the foundation of buildings, the filling up and grading streets with it, and vacant lots. The first twenty cases of the epidemic occurred within the limits where the earth was deposited and seemed to radiate from these deposits. Digging commenced about the middle of July and continued to November—season very wet and particularly in August. Fever broke out in September.*

Montgomery.

At Montgomery there had been considerable excavations for the purpose of laying down gas pipes, and the earth thrown up was stated by my informant to have been very offensive.

Hollywood.

At Hollywood, on Mobile Bay, an unequivocal case of the spontaneous occurrence of the disease is mentioned by Dr. Benedict, arising most probably (in a boy) when the sole cause to which it could be ascribed, was his being exposed to the fresh earth from digging a well.† Precisely the same thing has happened in *Algeria*, and mentioned by the French surgeons, engaged in the same business, those employed in it alone suffering while all the others escaped.

Gainesville.

At *Gainesville*, much disturbance of the soil from digging and "improving" roads, ditching. &c. Well dug—on cleaning it out it consisted of a sticky and stinking deposit.‡

In Charleston.

In Charleston these disturbances are forbidden by ordinance during the summer season, from their experience of their disastrous effects on the public health. Dr. Simons, who has been for some thirty years their chief Health Officer, specifies in his late valuable report on yellow fever there, that "in 1842, white laborers strongly predisposed to yellow fever were employed in opening drains and other works, and transferring the earth to different portions of the city, where drains were opened and the earth deposited—there yellow fever occurred, and the unfortunate beings who performed that work were the greatest victims. The same thing occurred in 1852. At the new custom-house a number of Irishmen were employed in excavating the earth and piling; a great many were taken sick and died; the sale and distribution of the earth through the city had a baneful effect." Other instances are mentioned of the dangerous influence of excavating and exposing offensive materials in opening drains and transferring the materials to other localities, even producing sickness in a class of persons who are usually exempt.

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* See the interesting report of Dr. Mabray, among our proceedings. † See his interesting paper in our proceedings. ‡ Mr. Fulsom.

Value of a sanitary survey.

These are some of the valuable results of the investigations of the Sanitary Commission. They would have been doubtless, greatly multiplied had it been in their power to visit personally (as was their desire) every district in the six States where this epidemic extended. There is no substitute for effective personal examination on the spot, and the public interests would be greatly advanced by a minute sanitary survey by competent men over the entire region. No geological survey has a tithe of the claims on the public interest, for salubrity is the *first* object for accomplishment for the public welfare. Public wealth is often developed by the first; the sanitary condition is much more often advanced by the other. An ignorance of the causes influencing the salubrity of cities, towns and rural districts often subjects them to the most afflictive calamities, entirely within control. This has already been made apparent by what we have already said, and will be made much more so as we proceed.

At the Chesapeake and Potomac canals.

By extending our examination into other climates we find the same injurious results have followed the upturning the earth for digging canals, opening roads, the establishment of brick-yards, and cutting down of bluffs. The excavations for the Chesapeake and Delaware Canal were very fatal to its laborers and the neighborhood, costing hundreds of lives; and so was that for the Potomac Canal, above Georgetown, a very large

And other countries.

In Africa.

mortality having resulted from the excavations. The writings of Drs. Drake, Evans, Blane, Cassan, McCulloch, Caldwell, Bailey, Thomas, and many others, are replete with instances in proof and illustration, and the whole body of physicians attached to the French army in Africa have given their opinion of its injurious influence in the production of fever.

At Martinique.

In *Martinique*, West Indies, "extensive disturbances of the soil, in the alteration and construction of roads in different parts of the island, causing great evolvement of miasm, causing the fever."*

Ft. de France.

At *Fort de France*, (Martinique,) "public opinion regarded the fever as due to the *cleaning out a canal* which surrounded the city."†

Same results on first cultivating a country.

The first disturbance of the original soil of a country for agricultural purposes (or the time during which it is passing through what I have elsewhere denominated the "transition period") is known to be highly injurious to health everywhere; and the devastations on the early settlers in all our newly opened districts of country are too well known but to be merely referred to in illustration, developing wherever they have occurred the worst forms of the diseases of those climates respectively. In a few years these subside, the insalubrity following the hardy pioneer along the outposts of population, to the margin of the wilderness, to each newly opened district, and then passing off like a morning cloud before the rising sun.

Disturbing original soil cause of our epidemic.

The special injury in a Southern country by *unskillful* clearing and exposure of the original soil, without protecting the homestead, has subjected this and the adjoining States, at their early settlements, to calamitous devastations from the most aggravated forms of endemic fevers—consisting of algid fevers, (called "cold plague" from the coldness and blueness of the surface,) sometimes running through its course in a few hours, and to which I never thought I could discover any acclimation—and it is only since the *status* of the country (in these respects, clearing and exposure) has become fixed and unchangeable that Louisiana has ceased to be called the "grave-yard" of the Southwest.

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* Dr. Amic. † Dr. Amic.

The special cause of every epidemic yellow fever in the Southwest of the United States.

Of the sufficiency of the cause to produce the epidemic here, I trust satisfactory reasons have been stated. Ordinary fevers of various grades and intensities of malignancy are produced every year by its greater or less prevalence; but the highest grade known to this hemisphere, (yellow fever,) and of such malignancy as characterized it last year in an *epidemic* form, is alone produced by such an exaggerated condition as then prevailed in a concentrated state, and from the facts presented in Chart A, I think I am justified in coming to the conclusion which I have, most deliberately, after a full reflection upon all the facts presented: that the *emanations arising from the upturning and exposure of the original soil in the summer season, together with filth, under certain determinate atmospheric conditions, has been the main, if not the special cause of every epidemic yellow fever that has ravaged not only this city, but the Southwestern part of the United States for more than half a century!* It is no exception to these statements that digging for mines, and especially, in cooler and more healthy climates (or climates less subject to *fever*) does not have the effect above alledged. My *second condition* (*the meteorological*) is wanting; that it is not always innocuous is well known, (of which I have given some evidence, and could have furnished much more.) Every climate is more or less influenced by particular pathogenic entities, giving it a liability to the evolvement of special diseases. That this has been injurious over a wide extent of Southern country, especially, of the United States, the testimony clearly proves; that it may be expected to be more mischievous in a hot and moist climate, is probable enough.

From the facts adduced and which are entirely reliable—skepticism itself may well be set at defiance. It has not been left to this late day to make these remarks for the first time, although they have not been probably as extensively generalized before, and acknowledgments and references have been made of it, in another page. This emanation from the earth may be the "*something divine*" of Hippocrates, it may be "*the something from the bowels of the earth*," that the great Sydenham nearer approached, to which modern science and observation has added, the atmospheric condition, to furnish it the necessary element of activity.

Testimony of Hippocrates and Sydenham

If I am accused of making a bold assertion, it is, by no means, a reckless one. The valuable records in the preceding pages and Chart, will fully sustain the position under the most scrutinizing investigation on the part of the city authorities, and with its *truth* and the precaution, it *necessarily teaches*—it must hereafter *much depend for its salubrity*, its exemption from the greatest scourge with which our fine country is so often inflicited, and its future prosperity and advancement so much retarded.

It is in vain to say that the facts which the Chart exhibits, are but *coincidences*, the records I have given from other places, the multiplied instances of personal experience, now that public attention has been called to it; amply attest its probability and establish its verity. Coincidence by itself, is of little account, it is constancy which gives it importance in the relation of cause and effect and establishes the law. Can that be called mistaking a sequence for an effect—a coincidence for a cause? Is it but a hasty generalization?—is it a *post hoc propter hoc* mode of reasoning to infer a law from a constant result, *in one case of near sixty years uniform sequence* (as in New Orleans)? *in three others*, (Mobile and Natchez and St. Francisville,) *of more than twenty-eight each*, and of a vast number of others that these pages exhibit, that an exception here would but prove the rule? And if proper records and observations had been made every where in the Southern country, who knows how immeasurably they may have been multiplied? It is consolatory then to know that sufficient facts have been collected to establish a principle,

Too many coincidences to be other than cause and effect.

Ample proof.

and that our generalization has not been hasty, and it is equally important to know that it is in our power to control them!*

Cause of ou endemics.

2d. For its existence in an ENDEMIC FORM other causes are adequate. The proposition then is that it requires an extensive disturbance of the original soil, or vast accumulations of decomposable materials to produce an *epidemic*, presuming that the meteorological conditions are present (and heretofore there have been always causes to produce them, when we have no recorded proof of their being present.) Let us proceed a step further, and this embraces our second proposition, or the causes of our ENDEMIC fevers, the difference being only in the amount and extent of causation. The distinction then between the major and minor proposition (the first and second) is, as a *general* to a *local* one. The causes are the same, differing only in degree—they are essentially identical, varying only in extent of prevalence, and sometimes in malignancy, which, it is also fair to infer, proceeds from the greater or less intensity of the original cause. Of these, a certain amount of fresh earth exposure, with other concurring circumstances produces an epidemic yellow fever and a less (supposing this earth and all filth the same, which I believe they are in effect) an *endemic*, what proportion of influence do they bear to each other? That is, the difference between the two, is the amount required sufficiently to poison the atmosphere to produce either the one or the other? It thus becomes almost a matter of calculation as a question of probability, which like all similar questions, must be liable to fluctuation within the fixed limits of possible error.

The cause of our bilious and periodic fevers.

3d. And this brings us to our third proposition, of a lesser cause of the same materials producing our bilious and periodic fevers.

The cause of *bilious and periodic* fevers, of all kinds, is so much a matter of common observation—is received with so much unanimity by the profession, that they need not be dwelt upon; I need only here enter my *caveat* in relation to the existence of any *specific* thing; as *necessary* to their production, (and called "*miasm*" par excellence)—but believe as I shall hereafter state more fully, that exhalations of all kinds, *whatever impairs the purity of the air, is the terrene agent,* if any is requisite, to unite with meteorological conditions and moral and physiological causes in the production of these fevers. The great error upon this subject, seems to me to consist, in supposing that *any one specific thing* is required, the effect, the disease, is one thing, but that, by no means implies that the causes producing it may not be manifold. Now it is perfectly clear to my mind, and I trust the facts and principles set forth will fully bear me out, that several conditions are pre-requisite for the effect.

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*I did not desire to incumber the text more with the collection of facts upon this subject from our own State—proving the connexion of disturbance of the soil with the occurrence of yellow fever and cholera, or, it might have been greatly extended.

Proof of yellow and periodic fevers convertible and the same.

The similarity of the influences, producing these various classes of fevers, is most manifestly shown by what occurs at the commencement and termination of these epidemics and endemics respectively—where the productive causes being much less in concentration, or weakened in intensity—bilious, yellow, and periodic fevers are *constantly observed running into each other, and blending their symptoms* in the same places, houses, and even individuals. A fever of a remittent or intermittent type occurs, and terminates in black vomit and the hæmorrhages. Another fever begins with yellow fever symptoms, with the eye, countenance, expression, to convince the even, inexperienced attendant, that it is yellow fever; in its progress it assumes the intermittent form, and so terminates. They are, then, clearly *convertible fevers,* dependent upon the more or less concentration of the same cause, and the susceptibility of the individual. They are constantly occurring here—even last year, bad as it was, the table F will show how common it was; baffling the most experienced to christen it. The distinction is a very important one, for it seems to settle the long disputed question of the identity of bilious and yellow fevers—that their differences *exist in degree only*—that the same may be between bilious, remitting, and intermittent fevers—a difference in intensity arising from a more or less aggravation of the cause. Here are steps from the one to the other, that are no less interesting than important—not in a merely speculative point of view, but in one of the greatest practical value to the community; for, if they are the same, differing only in degree, it settles finally, the great *question* also, of the *preventive power of sanitary measures against yellow fever.* Here we find no skeptic; no one doubts that of all the great zymotic or preventible class, fever is as much or *more under the control of these measures than any of them.*

Importance of this in a sanitary point of view.

The following remarks by Dr. Pennell, of Brazil, evidently a practitioner of acute observation, as he is known to be one of enlarged experience, are quite illustrative and confirmatory of the views taken above: "In the bilious remittent of Rio, says he, the mode of attack, the position of the pains, and the *state of the pulse and tongue are highly characteristic.* The prevailing epidemic preserved these features in a most singular manner, and with but little variation."

Identity of bilious and yellow fever.

"I believe the diseases are essentially the same. They begin in the same manner, they have the same diagnostic symptoms, and no one can distinguish between them, except by their severity; a difference which may arise from a more intense form of the disease, or from a superadded poison, as already mentioned. With the exception of black vomit, I have not in the prevailing epidemic, seen a single symptom which I have not also frequently witnessed in the common remittent of the country."

"In no other way than by supposing the disease of endemic origin, can it be explained how the natives and acclimated suffer so little. Yellow fever was never known in Brazil before, and was, therefore, equally new to them, and to those recently arrived. The former have, evidently, all their lives, or during the period of acclimation, been breathing a marshy, or any other endemic poison you please, in a diluted state, and consequently suffered less from a more intense dose. The poison had for years been incorporated

Proofs in Rio.

with their systems. This is most conclusively shown from the different influence of the disease, by the various mortality on the several classes of the population, [as exhibited in Section IV,] although it is acknowledged, at the same time, that almost the whole population was affected by it.

Of endemic origin.

"In no other way, than by supposing it to be of endemic origin, can it be explained, how ships come into port direct from Europe, with this identical fever on board."

How eminently applicable these remarks are to us here, all unprejudiced observers well know.

Why yellow fever not always break out with the apparent presence of the causes.

My proposition, then, in relation to the causes of our *epidemic* fevers, has, I trust, been fully sustained and corroborated by what has been shown to have occurred elsewhere (my other propositions have been equally satisfactorily proved.) If it will not equally apply to all the places where the yellow fever has appeared, it may be that there has not been *sufficiently concurring circumstances* of a congenerous nature, with the *meteorological condition*, which the Sanitary Commission has not been able to verify (from causes before stated). Again, it may explain the well understood fact, that many cases of the disease have been carried to certain villages and country seats, and have terminated with the individual, as in ordinary years, not spreading to the family or visitors. These appear to me satisfactory explanations of what has been a stumbling block, not with the public only, but with many of the profession.

Two conditions necessary for an epidemic fever.

From the foregoing facts and observations, it is palpable enough that *two conditions* are required for the existence of an epidemic fever, viz: an atmospheric and a terrene or local cause. The proofs of it are so abundant that whenever they are omitted, it may be safely ascribed to *the fault of the observer*. In all, and everywhere, the influence of atmospheric conditions are found paramount and indispensable to the disease, and *equally so* is what is denominated "the focus of infection,"—that is, the presence of some localising filth, exposure of soil, &c. (all equivalent conditions). These are universal—there is believed to exist no exceptions to it. The occurrence of one of the conditions is not sufficient. Many proofs and illustrations of this have been mentioned in Section V, and they could have been greatly multiplied, not only this year, but every year of the existence of yellow fever either here or in foreign countries.

The presence of an acclimated population prevents effects proportionally to the cause.

That yellow fever should not occur at once upon all exposed, and in a fair proportion to their amount, is also satisfactorily explained, I think, by the fact, that a large portion of our population is acclimated to the disease, and is no longer susceptible. Nor do I suppose it necessary to say, in order to convince the public of the reality of the causes and effects, which I alledge, that our climate is peculiar; for there is a second condition, equally essential to the production of the effect, which may not exist in other climates, although usually present here, viz: heat and moisture. I am fully sensible that different climates have different diseases, and that the peculiarities that produce the manifestation of one kind of disease in one climate is wanting in another. The facts and principles, *as applicable here,* have, I trust, been satisfactorily demonstrated.

All climates have different diseases.

Although I look upon yellow fever as a specific disease, to which the subject is rarely liable but once; I am equally confident, that it is the result of the aggregation of circumstances and conditions, a less amount of which produces the ordinary fevers of the locality. This result I come to, after a pretty thorough personal examination of the facts, in many of those climates where this disease has been worst. I do not think this unreasonable, for we are not without analogies in other diseases, even where they are specific. Consumption is due to an impoverished diet, and bad physical and moral conditions in an unfavorable temperature, and it is eminently illustrated in Cuba, *where more of it exists (and particularly in Havana,) than in any part of America.* Measles, scarlatina, small-pox, have often arisen under certain atmospheric conditions, (warm, moist, and variable—*out of season,*) where they have defied the utmost scrutiny to detect a personal cause, and may have arisen from some of those combinations which originally gave them birth, and that in other circumstances, with the addition of the important elements of heat and moisture, give origin to fever. Can any one inform us why *small pox* should have had its birth about the period and place of the imposture of Mahomet? *Scarlatina* and *measles* also derive their parentage from the East, and are of comparatively modern origin. *All diseases have had their time and place of commencement.* Mr. Meriam informs us that cholera and small pox at St. Iago de Cuba, immediately followed the fearful earthquake that nearly destroyed that city, on the 20th August, 1852. Some diseases have disappeared—may be, never to return—but who can predict it, and upon what grounds? Some appear at intervals of fifteen or seventeen years, as the eruptive fevers, cholera, &c.; others at periods varying from fifty to one hundred years, and attack only one particular race. The Mexican *matzahuatl*, attacking only the *aborigines* of that country, notwithstanding other races were similarly exposed to it—about once in a century. The "sweating sickness" attacked only the English, wherever they were found, whether in England or in the heart of Europe! Most climates have their special diseases or forms of morbid action. Need I mention goitre, cretinism, leprosy, elephantiasis, biri-biri? They, unquestionably arose *from some combination of physical elements*, that either do not exist in other regions, or that have become controlled by the mode of living, the refinements of civilization, the extension of the comforts of life to the lower class, and the application of sanitary laws to all the purposes of living. I see, then, no reason why we should not be satisfied with the causes enumerated, as sufficient for the production of yellow fever, and particularly as their removal prevents or expels it. Indeed, it is not affirming too much to say, that we *actually know more of the causes of yellow fever than we do of those of any known disease, beyond the class "fevers," and as much as we do of any in it!*

Don't know the real cause of any disease.

How diseases have been changed.

The influence of climatic conditions and modes of life, in

Parallel of plague and yellow fever.

Similitudes.

Blach vomit.

Marshes.

Moisture.

Repetition of attack.

Latitudes.

evolving peculiar forms of morbid action, is not only shown in those above mentioned, but is felt also in the great class of fevers—the typhus, of England, the great avenue to death there—is materially different from the fever of the African coast; and this differs from the yellow fever of the West Indies, which again differs from the *plague* of the East. The *parallelism of these*, as well as their points of divergence, becomes the more interesting and instructive, when we reflect that the countries are situated in similar parallels of latitude, that they have several points of geographical similitude, and there is the strongest grounds for believing that they are both entirely under the influence of sanitary measures. The *plague* occurs on the subsidence of the Nile; so does the *yellow fever* on the subsidence of the Mississippi. The plague localities are surrounded with ponds, stagnant canals, with decaying vegetable matter, exhaling their poisons to the atmosphere, accompanied with great *humidity*.* Such is precisely paralleled here. The plague is sometimes marked by jaundice (or icterosed) and black vomit, and yellow fever sometimes has buboes and carbuncles—as was the case here last year. One attack usually exhausts the susceptibility to the recurrence of the disease, in many instances, much more certainly in yellow fever than in plague. At Constantinople, which is about the latitude of Boston, there is no acclimation against plague, any more than there is in Boston, New York or Philadelphia, against yellow fever. They are both diseases requiring a great concentration and aggravation of their producing causes, (as meteorological and terrene conditions) and hence both are diseases of cities, or wherever these causes exist in an eminent degree. Both have occurred in latitudes far North of their customary habitats and birth places under strong *temptation*. The latter, in England. formerly in latitude 52; in Moscow, in latitude 57, as late as 1771, '72, with a mortality exceeding our epidemic of 1853, by at least 500 per cent.—nearly half the population dying, and a similar mortality occurred in Marseilles in 1720. The former has prevailed under similar circumstances, as far North as 42, and even beyond it; and in Cairo, from 10th February to 10th June, 1835, out of a population of 240,000, fifty-seven thousand died of plague, or 23¾ per cent.

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* Prof. Gliddon.

Neither contagious.

There is another respect in which their similitude is almost equally exact: *neither are contagious.* In their endemic form, this is hardly disputed, but when the causes producing either, are sufficiently intense to produce an *epidemic;* then *within the epidemic* influence, they are both apparently so. For it has been clearly proved, by the long and intelligent experience of the renowned Clot Bey, (so long the distinguished Physician-in-Chief to Mahomet Ali, in Egypt,) that he had never known the plague to be communicated by contact, "when *removed from the regions of malaria, and all his attempts to communicate it had utterly failed.*" It is unquestionably just so with yellow fever. *The plague often occurs alternately at Cairo and Alexandria, with constant uninterrupted communication between them, without the suspicion of contagion*, or the slightest appliance of quarantine. The same occurs in New Orleans, in relation to her numerous sister cities which have constant communication with her.

Attacks of plague most frequently take place at night, when the damp and heavy dews predispose to the disease. Such is often the case with yellow fever.*

Dissimilitudes.

Their points of disagreement are equally remarkable. In Egypt, the *plague* attacks most frequently the *natives*—those, in fact, who live in the greatest filth, and on the most meagre diet—and Europeans, and especially those from the North of Europe, with an appropriate personal hygiene, are rarely liable to it, and thus are probably much more exempt from it than if similarly circumstanced in this region, they would be from yellow fever, although these are great protectives. In *yellow fever* these susceptibilities are reversed. The liabilities produced by temperature are very different also. Although each occurs sometime after the subsidence of the two great rivers of each country; the Mississippi begins to rise in January and February, and falls in June and July, and the yellow fever occurs in July and August, with our highest temperature. The Nile begins to rise in June, and about the 20th of August the whole valley of the river presents the appearance of a great inland sea. About the autumnal equinox, the waters begin to subside, and before the end of November the river is once more within its banks. The *plague* usually commences on or before March, and terminates towards the middle of June—the occurrence of the *inundation* puts an end to the plague—the yellow fever occurs on the *subsidence* of the Mississippi. "The experience of ages incontestably establishes that the plague *cannot exist* with a temperature above 80°, nor a little below 60°." With yellow fever it is different: a long continued temperature of about 80° *is required for its production*, and over 90°, unfavorable to its development. Nor does a lower temperature, at once, extinguish it—being usually a fever of a limited period (60 to 90 days*,—the *epidemic*, I mean,) when commencing late, it often continues after a frost, and even when the thermometer sinks below 32°, although not in the *epidemic* form—yet it usually subsides here with the occurrence of cool weather, and even when the *average* daily temperature is not below 70°, and at all points South of us it subsides when the thermometer is still at even higher grades. In other countries than Egypt, the plague has existed as a summer and autumnal disease—reaching its culminating point in August and September, as our yellow fever here. Of the extent that they are influenced by sanitary regulations, I have already spoken of the plague; I shall hereafter dwell extensively on that of yellow fever.

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*RECOLLECTIONS OF J R. GLIDDON, ESQ.

1st. All the plagues remembered by me, (1818, '41) that is about five serious *epidemics*, began at Alexandria about November, *after the rains*, and in damp, cool weather—temperature, (thermometrically) unknown. It is also the season of the ebb of the Nile, and commencement of vegetation, (in Lower Egypt) as the slimy ooze emerges from the flood.

2d. All were temporarily weakened by the colder and drier weather of January, with its bracing N.N W. gales

3d. All arose to their intensest action *between* February and April.

4th All vanished, as *epidemics* by 15th or 30th June

Hence, (ceteris paribus) the most deadly seasons of the plagues in Egypt, corresponded to a temperature and to an atmospherical condition—such as we had at New Orleans in February and March, 1852. [Very damp and oppressive.—E. H .B]

Acclimation.

Period of occurrence.

Temperature required for each.

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* An average of about 60 days.

Egypt has no marshes (properly called), and except during the period of inundation, the climate is distinguished for its aridity. It is mainly on this account that it is famed for its remarkable influence in the cure of phthisis. Even as early as the time of the younger Pliny, he states in his letters that it was not uncommon to "send patients suffering from a tendency to consumption to the softer climate of Egypt."

Influence of its climate on consumption, and why.

Such are some of the more remarkable similitudes and diversities of these two great monarchs in Eastern and Western diseases, and fortunately, the valuable records of history bear us out in the statement that *both have yielded signal triumphs to sanitary measures.*

I have stated what have been the constituents of an epidemic atmosphere (meteorological and terrene) so far as the present state of science will enable us to give them, together with the important and interesting exhibit of Prof. Blodget. I do not deny that there may be others,—that must be left to future research to find out. Both have probably existed when the epidemic developed itself; when it has not, probably but one. The localising circumstance—disturbance of the soil, or filth of every kind, (which I presume to be of a congenerous nature,) has probably been wanting. Of the same character do I view half-dried swamps that have been recently overflowed. Now, it is well known, that for several years most extensive inundations have prevailed over a large portion of our State, and over the cultivated, as well as the uncultivated portions of it. That, as these have become partially desiccated they reach the conditions of all half-dried swamps, which are known to be highly injurious to health everywhere, and with the concurrence of the meteorological conditions, they have formed that combination of circumstances necessary for the existence and spread of a great epidemic.

Effect of our half dried swamps.

Know as we do of any disease.

These inundations are not only connected as one of the prominent causes of our great epidemic of 1853, but with the cholera and sickness of preceding years. This statement is not hazarded without extensive inquiry, and is in strict accordance with all medical experience, as recorded elsewhere. The lesson taught us is full of instruction, when it shows that not only the agricultural interest of the State is ruined by these repeated inundations, but, what is far more important, the salubrity of its population. It is demonstrated then, that the most active supervision upon the part of the State authorities is not only essential for its future prosperity—but for its existence.

Inundations cause of increased sickness in this State.

That it should begin in New Orleans is not at all strange. It must *begin, or be developed somewhere*, and it is most within the bounds of probability that it should first arise there, where should exist the greatest concentration of these causes, and the largest number of unacclimated subjects, without the necessity of resorting to contagion, or even the extension of infection, to account for it. It must also be considered that the population of the rural districts, being always accustomed to breathe a purer air, are more susceptible of an epidemic influence when it has broken out.

Why the epidemic should commence in New Orleans.

In corroboration of the position that the general extension of the epidemic is partly due to the late inundations, and in striking conformity to it, *those parts of the State which have suffered most from the epidemic have been the greatest sufferers*, so far as we can learn, by the inundations. I quote freely from the high authority of my friend, Dr. La Roche, of Philadelphia, (probably, the highest authority now living,) who has written extensively upon the subject.

Late inundations promoting the spread of the epidemic.

"The examples of the injurious effects of draining and desiccation by artificial or natural means, and conversely, of the beneficial effects attending *complete* draining of marshy and insalubrious surfaces, or their complete submersion, are numerous and conclusive. They establish, beyond controversy, the fact that the insalubrity of marshy localities increases in compound ratio to the degree of desiccation they have attained. They show that the greatest insalubrity and mortality in such *local-*

ities always coincide with the period of greatest desiccation, *short of a complete dryness;* that this effect occurs earlier in hot, than latitudes where the drying process is slower; earlier when the season is precocious, and the reverse when it is tardy."

Dangerous in proportion to desiccation short of complete dryness.

"The extensive prevalence of fever during hot weather, after the overflow of river, lake or pond banks, and at the receding of the water is well known to all medical readers, and has been noticed everywhere, and at all times." "The inundation occasioned by the overflowing of the Tiber, and the disease resulting therefrom, are referred to by Livy, Dionysius of Halicarnassus, Dio, Strabo, &c. Like effects were observed and noted in the twelfth and thirteenth centuries, under the pontifical reign of Innocent III, in the fourth, under that of Clement V, and are particularly described by Lancisci, who accurately pointed out some of the causes of the disease to which they gave rise.

Inundations of the Tiber.

The city of Strasbourg, in France, is not often visited by malarial fevers. In 1824, the banks of the Rhine were overflowed, and remained for some time under water. Soon after the water had receded fever began to prevail, and continued to do so *during three consecutive years.* Nor did it cease before the soil became perfectly dry." "The occurrences recorded in Italy, Germany, Egypt, India, Senegal, Algeria, and many parts of our own country. The irrigations at Oran, Karguantil, Silie-bel-Abbas, and other districts of Algeria, where the practice is extensively applied to agricultural purposes, and is carried to such an extent as to occasion a sort of daily inundation. Those of some of the departments of France, as well as those resorted to in the rice plantations of this country and Italy, have been found to give rise to the same morbific effects wherever and whenever the thermometrical condition of the atmosphere is such as to aid in the extrication of malarial effluvia. "Near the walls of a large city stood a very extensive and deep pond of water, which for forty years had served as a receptacle for all the filth from the houses and streets. As long as these putrid

At Strasbourg

In France and Italy.

matters remained covered with water they were productive of no mischief; but when they had so far increased as to rise above the surface of the water, a most malignant fever spread through the tract of country adjoining the city."*

At Lyn Regis.

"Dr. Robert Hamilton, of Lyn Regis, in a pamphlet quoted by Bancroft, and referred to particularly in the London Medical Gazette, describes a remittent fever, produced in that place in 1779, by a freshet which occurred from the sea. The inundations from the sea are generally followed by severer consequences, in respect to health, than those from fresh water. If they extend far they cover much low ground under cultivation, and fill many ditches which, in many situations, cannot be drained by any other means than evaporation by the heat of the sun. The intermittent fevers which follow are of the worst kind, the effect being due to the dead fish that remain, and the effluvia from the destruction of reptiles, insects, &c., and vegetables which are destroyed by sea water. The gale of 1719 was attended by such an inundation, the effects of which developed by the heats of *five successive summers and autumns*, were seen in the fevers of those years, which were more violent, universally epidemic, and more fatal than Dr. Hamilton had seen them in the last forty years. These fevers have ceased to show themselves. The country around, which was once one of the most unhealthy, has become one of the most salubrious by the *complete draining* of the Bedford level."

At Bassara as an act of vengeance.

"When the Arabs, (as we learn from Mr. Ives), wish to take vengeance on the Turks of Bassara, they break down the dykes or banks of the river, and inundate the plains. On its evaporation the water leaves a marshy sediment which infects the atmosphere, and occasions fatal epidemics. During Mr. I.'s sojourn in that country the mortality from an occurrence of this kind amounted to no less than fourteen thousand. The same effects are produced at Bassara, and to a highly destructive degree after the ordinary overflowing of the Euphrates. Of the

In Egypt.

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* Precisely the circumstances under which Gormley's Canal has become so injurious.

consequences arising from simple inundation, Egypt affords a similar example, inasmuch as its season of fever commences with the subsidence of the Nile. Every one must know that equally disastrous results have often attended the overflowing of the Danube, the Don, the Tigris. The yellow fever epidemic of Laguayra, in 1797, the first known to have occurred in that place, has been referred with much plausibility to the overflowing of the river of that name."*

At Laguayra; its first yellow fever.

The same results occur on the subsidence of the Nile. The exposure is direct and immediate to a burning sun as before mentioned.

The same effects occur here on the subsidence of the Mississippi, and its early or late subsidence materially influences the result; the period of decline is the period of fever. That the inundations of the banks do not usually produce their disastrous effects until the second year, is not difficult of explanation. The ordinary condition of our swamps (not marshes half-dried) is not injurious to health, as is well known throughout the State. When this is vastly increased by a crevasse, large additions are made to the swamp water. The cultivated country is inundated, and by the natural subsidence of the water is converted into a marsh, and has to undergo the successive poisonous stages of desiccation, with the evolution of results through solar influence, which takes a season or two, fully to develope. That the first year of inundation is not injurious, clearly results from the immediate removal of filth; that the second year the effects mentioned follow as results, is proved by the following authentic data, of its influence on this city, aided and aggravated by causes I have before dwelt upon. Of the direct influence in the country we have no sufficient evidence.

Inundations here do not produce disease first year.

Extensive crevasse, inundating large part of the city and neighborhood in............................1816.
An extensive epidemic yellow fever in...................1817.
The hurricane inundating the city to Bourbon street, 1821.
Epidemic yellow fever in................................1822.

Always the second year.

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* La Roche.

The rear of the city inundated by a storm to Dauphine street in..............................1831.
The great epidemic of cholera and yellow fever in.......1832.
A severe blow drove the water of the Lake to Dauphine street in..................................1846.
An extensive epidemic occurred in......................1847.
Extensive inundation of the city to Carondelet st. in 1849.
About three thousand cases of yellow fever, and an increase of more than one per cent. in the general mortality of the city above the average in......1850.
There was a crevasse opposite the city in...........1852.
Large mortality of the epidemic in Algiers, which we have attributed to other causes, in..............1853.*

Different stages of draining produce different diseases

"The pond of Lindre Basse, in the department of the Meurthe, affords a curious illustration of the effects of the different conditions under which the malaria is generated, in modifying diseases arising from paludal infection. The first pond managed according to the triennial system common in Saloque, is two years under water, and one year dry. In the first year it is half filled, and gives rise to intermittent fevers; in the second year it is full, and typhus fevers prevail; in the third year, after being fished, it is left dry, and cultivated as a field, and in this year carbuncular affections appear. These diseases have succeeded one another as regularly and invariably as the different states of the pond for a period of *sixteen years*, and the idea naturally suggests itself that diseases that have a common origin must have a more or less common nature, however much they may differ in outward appearance." These remarkable facts have been fully illustrated by what has occurred in the neighborhood of this city, and other parts of the State, during the last and preceding years.

Northwestern limits of the epidemic.

From the following extract of a letter to me from my old friend, Judge Bry, of Monroe, Washita, who, nearly at the age of eighty, still devotes himself, although almost blind, to the cause of science, the same views are put forth as the result of his long experience in this country; it also exhibits the Northwestern limits of this epidemic. "As a general observation on the river, (Washita,) I can venture to assert that except at Trenton, where the epidemic may have owed its existence to local causes, and Monroe, where it seems to have been brought from Trenton, the valley of the Washita was never healthier. From here to the mouth of the river, (170 miles,) there has not been a case to my knowledge, nor above, as high as the Hot Springs. I expected we should have had a sickly summer and fall, from an observation of fifty years standing, to wit: when the overflowed lands of Lafourche, East of the river, are covered by the general height of all streams connected with it, late in the spring, when vegetation is far advanced, high grass, shrubs in leaves, &c., the season after the secession of the waters will be unhealthy; that is to say, that the common autumnal intermittent fevers will prevail to a much greater extent than when the rising of the waters is earlier, and before vegetation is advanced. It would be worse than useless to mention to *you* my opinion as to the cause of that effect on the sanitary condition of that part of the Washita valley parallel to the overflow of the Lafourche."

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* These inundulations doubtless aided the causes to which we have specially attributed the epidemics, and epidemics have occurred from the causes enumerated, without the inundations as in 1819, '29, '33, '37, '41, &c.

Effect of the inundation late in the spring.

"I have also observed that principally, when the waters subside, the Eastern side of the river is healthier than the Western in many localities, of which Trenton is one. The receding waters have exposed to the sun, &c., large spaces or flats on the Eastern side. I have seen the vapor exhaling from these flats wafted as very thin fogs to the Westward at the rising of the sun, as if its rays drove them across, the air being perfectly calm. There have been what is called several cases of the epidemic, which readily yielded to good treatment and good nursing, but, in my ignorance, I believe that they were the common autumnal fever, assuming the type of the prevailing disease."

Effect of exposure after inundation.

Can it be any longer doubted, then, that the extensive inundations to which the State has been subjected for the preceding four years, has been one of the efficient agents in the production and spread of an epidemic unparalleled in our annals, and from a concurrence of the causes we have mentioned?

Observation and experience must precede science. *We* have had experience without observation, and if we will not be bettered by our own sufferings, may be, we will by that of others —let us then see what has been the farther result in those nations which have grown wiser and better by the combination.

At Demarara. "By draining and clearing at the British colony of Demarara, within 6° of the equator, success has followed in rendering the cultivated portion of the deepest and extensive morass, probably, in the world, a healthy, fertile, and beautiful settlement.

Near Philadelphia. "A large peninsular of land between the Delaware and Schuylkill, adjoining the city of Philadelphia, called the Neck, was formerly in its unreclaimed state, subject to the devastations of annual bilious diseases. Draining, banking, and cultivation have converted the marshes into fields and gardens, and the spot which once reeked with pestilence, now yields a rich harvest to the hand of industry, and promotes that health which it once destroyed. Another impressive instance of the effects of cultivation in reclaiming a swampy and sickly district to healthfulness and prosperity, is derived from the history of **Near Calcutta.** Calcutta, and the country around it. That city, built in a morass, on the banks of the Hoogly, was originally a speedy and almost certain grave to Europeans, who resorted to it for the purposes of commerce. But a well regulated police within, and the thorough cultivation of the environs without, have entirely altered its condition. The same is true of various other cities in the province of Bengal. The examples in illustration of our subject could be multiplied a hundred fold, were it necessary, to show that disease and mortality are receding before the efforts of industry, and life is prolonged by the enterprise of man. In some of the worst of marshy lands, where the thrifty Dutchman has robbed the sea of its domains, and which he only retains by his dykes, and by pumps worked by windmills, the effect of constant cultivation has powerfully counteracted those causes which at Walcheren, a few years back, nearly destroyed an English army.

In Holland.

"The Pontine marshes were once the home of a thrifty, active, and healthy population. It then contained thirty-three towns—now nothing meets the eye of the traveler but here and there a solitary post-house, tenanted by wretched beings, rapidly sinking under the effects of various influences. It owed its former condition to its large population and constant tillage—to the extreme attention paid to draining the deposits of stagnant water, which accumulated upon it; to the acqueducts traversing it in all directions, affording pure and wholesome water; and to the protection afforded by groves. The present condition, is owing to the entire neglect of cultivation—the destruction of the acqueducts, pouring their contents over the campagna, giving rise to numerous stagnant lakes—the forests cut down—the whole region presents one wide scene of desolation and ruin.

Near Rome.

"There are some precautions to be exercised, however, in these drainings, of which it is necessary to be apprised, for history is not without examples of its occasional lethiferous influence. First, then, partial drainings, or reclamations, are much more dangerous than the condition of undisturbed nature. Submerging swamps is probably less hazardous than partially draining them, for from the experiments of Williams, the evaporation from the surface of moist land, covered with trees and other vegetables, is *one-third greater* than from the surface of water, and it is a well established fact, that the *moister the earth*, the *more dew falls* upon it (under a similar exposure.) Experience has fully confirmed these views. The protection afforded by forest growth, acting as a screen, to impede the wafting of exhalations from recent clearings, has been often recorded in the history of medicine, and perhaps may be the reason why the ancients consecrated the woods in the vicinity of Rome to Neptune, in order to secure them from the

Precautions necessary.

More humidity than water.

Value of woods.

axe. To the final removal of these woods has, with some reason, been attributed an increase of danger to the unprotected city. Near St. Stephano, on Mount Argental, a convent is situated, which was famed for the salubrity of its air, but, since the forests which surrounded it have been cleared, it has become unhealthy. At Villitri, near the Pontine marshes, the cutting of an intermediate wood occasioned immediately, and for three successive years, fevers and other diseases, which committed great ravages. The same effect was discerned from a similar cause, near Campo Salino; and analogous examples might be adduced from Volney, Lancisci, Donas, and others. In our own case, a range of forest growth could be easily left to protect us from the additional emanations evolved, until *effectual reclamation* and *cultivation* shall have dissipated every possible danger.*

I should do great injustice to this part of my subject, were I to pass over the local influence derived from the conditions of *our half cleared and half drained swamps* in the rear of this city, on the epidemic of the *last season*—with their large, open, sluggish conduits, reeking with the most filthy materials it is possible to conceive—the refuse and drainage of a large portion of the city—of the half dried and pestiferous basin and canal of Gormley, with the offensive soap and tallow factories—vacheries, and dung heaps near it—in the immediate vicinity of which broke out some of the earliest and worst cases of the epidemic, and whose entire neighborhood, in proportion to the population, probably, occurred a larger mortality than any other section of the city. (See Sanitary Map.) And I now reiterate my firm and unalterable conviction, that it is utterly futile and deceiving the public and ourselves, to anticipate the enjoyment of health here, while the most thorough correction is not made in these and other hot-beds of pestilence. In fine, until the thorough drainage with covered canals—made in the cool sea-

The baleful effects of our half dried swamps.

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* The above quotation is derived from an introductory lecture to my class when Professor of the Institutes and Practice of Medicine in the Medical College of Louisiana, in December, 1835, and *published then.* Had the warning been taken and the advice heeded, the disastrous results of clearing and draining, *in the mode it was done,* would not have followed—in the *large increase* of our mortality ever since. But, we are in our infancy, and infants require many lessons. Is that of 1853 sufficient?

Result of its improper exposure since 1846.

son—should have existed long enough (a year or two) for an undergrowth to cover the soil—now desiccated—then the clearing may take place, leaving rows of trees on avenues and streets, to absorb bad air, but not sufficient to prevent thorough ventilation. The imperfect manner in which this has been done, ever since 1846, and even before—about which time progress was made in the GREAT EXPOSURE IN THAT DISTRICT, is shown by the rapid manner in which the mortality has been gradually increasing—resulting in an average annual mortality (inclusive of last year) of 6.86 *per cent. to the entire city population.* This is shown on the Chart A, so as to defy all skepticism, and is derived from official documents.

The two conditions.

Illustrated in Demarara.

And in different years.

A remarkable instance, illustrative of these views, is furnished by what has occurred in British Guinea, during the last half century. The yellow fever has occurred there in determinate or oscillatory periods approximating to a metonic cycle (of about nineteen years). The only atmospheric element that has been specially referred to, to which adequate efficiency could be properly ascribed, was the agency of the wind (the heat and moisture there, is always abundantly great). The direct effect of these was to produce a most unusual elevation of equinoctial tides—even to the extent of thirteen feet; the consequence was, as the country is very low—embankments being now required to keep out the sea—the draining canals that take away the filth of the town (Georgetown) are imperfectly emptied—the river deposits its detritus in the neighborhood—a vast embankment is formed from the accumulation of these alluvial depositions, in and about and before the town, and precisely co-incident with the acme of these accumulations is the outbreak and development of epidemic yellow fever, and which is *exactly limited to this condition.* When this ceases, and this embankment disappears, the sea, now encroaching and washing it away—together with a clearance of all these estuaries, by its scavenger influence—*the yellow fever disappears.* Farther to show that this is cause and effect, *so long as the period of deposition and exposure continues, so lasts the disease—when this* *ceases, so ceases the disease.* At the termination of the last century, three years sufficed for the purpose; so in 1820–'21–'22; but, during the last occurrence, it continued about ten years—*1835–'46. Heat and moisture exists to a great extent in these low countries, robbed of the sea; so here were both blades of my "shears." Now, whether those were emanations from the *newly made* or *newly exposed earth*, formed of these alluvial depositions—producing vegetable or animal effluvia or poisonous animalculæ, in concurrence with atmospherical conditions—is not material to my purpose, or necessary to show. It is the *conjunction of the two*, with the almost inevitable effect that I wish to point out, and further, that during these epidemic visitations, "atmospheric changes and occurrences of *an unusual character* are ordinarily apparent," and wherever proper attention has been paid to these, they have never been found to exist. Hence there occurs a satisfactory exhibition of all our epidemic requirements, terminating in the epidemic itself. Dr. Candido, a distinguished physician of Brazil (Rio), avers the same thing. He states most distinctly that "in addition to filth of various kinds, certain meteorological states were required to develop the fever at Rio, and these were, a temperature above Reaumur 20°, 77° Fahrenheit and humidity."*

And in Rio.

SECTION VIII.

Localising conditions continued, and farther specified—Value of pure air—Peculiar air of cities—How and when made impure—How much spoiled every day, and value of ventilation. Bad air spoils the water—How to procure it good—Bad water promotes intemperance—influence of cemeteries--ditto of privies, street filth, &c., &c.—How much of the air from these causes will kill a bird—a dog—a man—Best pavement—What best houses—effect of low empty lots—What is not miasm—What is—Drying power not cause of fever—Fundamental proposition—Effects must arise from adequate causes—Cause of yellow fever known—Parts of cities where always breaks out—Proofs—How spread—Exact value of spontaneous cases—

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* Blair.

TABLE P.

WINDS—AVERAGE FOR A SERIES OF YEARS.

Hygrometry of Each of the Principal Winds at New Orleans, and when calm.

DEGREE OF DRYING POWER.			AMOUNT OF MOISTURE. [Saturation being 1000.]			ELASTICITY OF THE VAPOR.			WEIGHT OF VAPOR IN A CUBIC FOOT, *In grains.*		
1st	N.W.	11°.29	1st	N.W.	.677	1st	N.W.	.468	1st	N.W	5.136
2d	N.	10 .06	2d	N.	.698	2d	N.	.534	2d	N.	5.819
3d	S.W.	10 .03	3d	S.W.	.727	3d	N.E.	.630	3d	N.E.	6.847
4th	W.	10 .01	4th	W.	.740	4th	W.	,646	4th	W.	6.915
5th	N.E.	9 .28	5th	S.	.761	5th	E.	.646	5th	S.	7.181
6th	E.	8 .84	6th	N.E.	.763	6th	S.W.	.664	6th	E.	7.213
7th	S.	8 .21	7th	E.	.768	7th	S.	.743	7th	S.W.	7.229
8th	S.E.	7 .56	8th	S.E.	.720	8th	S.E.	.759	8th	S.E	8.030
9th	CALM	5 .17	9th	CALM	.929	9th	CALM	.761	9th	CALM	8.254

N. B.—To my scientific readers I observe that some few small errors in the above could only have been ascertained when the *results* were arrived at—but at too late a period to re-calculate sixty pages of figures.

TABLE Q.

Statement of the Winds in New Orleans—by Months and Seasons.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W	CALM.	EXPLANATION.
January	4.½	4.¼	5.	3.¼	3.½	1 ¾	2.	2.½	0.½	Being on an average of 11 years—1835–'42 and '48–'50,
February	4.¼	3 ¼	4.¾	2.¾	3.	2 ½	1.½	4.	0.½	
March	4 ¼	2 ¾	5.½	3.½	7.	2.½	1.¼	2.	0.¼	
April	1.½	2.¾	6.½	4.¾	6.¾	2.½	2.¾	2.¼	0.½	
May	2.¾	2.¾	5 ½	4.	6 ¾	3.¾	1 ½	2 ½	1.	
June	1.¾	1.¾	6.½	4.½	4.¾	6.	1.¾	1.½	1.	
July	1.	2.	5.	5.	6.	4.	3.	1.½	3.	
August	3.½	3.½	4.	3.½	4.½	4.	3.¼	1 ¾	2.	
September	6.0	6.½	6.¼	1.¾	2.¼	1.½	1.¾	1.¾	0.¾	
October	6.½	5.¼	7.	1.½	1.¾	1.	2.	3.	1.	
November	5.¾	1.	4.¾	3.¼	3.¼	1.	1.	3.½	0 ½	
December	7.¼	4 ¼	5.½	3.	3.	1.¾	1.¾	1.¾	1.½	

BY SEASONS.

Winter	16.	11.¾	15.¼	9.	9.½	6.	5.	8.¼	2.	Total number of days' wind each season.
Spring	8.½	8.¼	17.½	12.	20.½	8.¾	5.½	6 ¾	1.¾	
Summer	6.¼	7.¼	15.½	13.	15.¼	14.	8.	4.¾	6.	
Autumn	18.¼	12.¾	18.	6.½	7.¼	3.½	4.¾	8.¼	2.¼	
Winter	1st	3d	2d	5th	4th	7th	8th	6th	9th	Relative frequ'cy of each wind during each season.
Spring	5th	6th	2d	3d	1st	4th	8th	7th	9th	
Summer	7th	6th	1st	4th	2d	3d	5th	8th	9th	
Autumn	1st	3d	2d	6th	5th	8th	7th	4th	9th	

BY THE YEAR.

	3d 49.	5th 40.	1st 66.¼	4th 40.¾	2d 52.½	6th 32.¼	8th 23.½	7th 27.¾	9th 12.½	Relative frequ'cy of each wind during the year.

ERRATUM.

On "Radiation Chart"—opposite,—for "*Radiation of the Sun,*" read Radiation.

Several mentioned—What they prove—Prescription to produce yellow fever—The cause of yellow fever proved—Philosophical rule—Clear deduction—Practical value—Hope for New Orleans—Our duty—Value of truth in Medicine—Health first great object in government—Insalubrity of a city punishable offence.

Let us proceed to the second branch of the localising conditions in the production of yellow fever.

This subject would hardly admit of an array of facts, or attempt at argument in its support in the present enlightened and advanced state of society, had not some doubts been thrown upon it, and their influence impugned of late.—Indeed, in few things is the progressive march of the age we live in more strongly characterized, than in the efforts to improve the sanitary condition, by the removal of the filth and offals of society, as destructive to its welfare, as the effete and worn out parts and excretions of the human being is to it individually. The care bestowed on these objects is at once a test of high civilization and of personal refinement, and the performance of one of the very first duties of civil government, as highly conducive to the preservation of the health and lives of its citizens. The history of man proves this in every age and nation; and as attention to these indicates the progressive improvement of nations, so, their neglect, in a similar manner, is a conclusive proof of their decline. In no countries are these more eminently illustrated than in what we read in the history of the successive rise and decline of ancient and modern Egypt and Rome, in their several revolutions; and it is farther demonstrated most clearly, that with this blessing comes a higher tone of public and domestic morals—greater elevation of character—improvements in the comforts and enjoyments of life—and with them a greatly increased average duration of it.

Attention to sanitary measures a test of civilization and refinement.

At this enlightened day to believe in the existence of an effect without a cause, is to confess one's self an atheist. To express a conviction of the impossibility of man's altering or influencing his physical condition, and, of course, all its consequences, is to acknowledge one's self a fatalist. The Su-

Providence influences man through secondary causes.

preme Being acts upon and influences all conditions and circumstances on earth, *through the means of secondary causes.* These act by laws impressed on man's being throughout his existence, and there exists as surely *laws of disease* as there are *laws of health.* If a man infringes on the latter he falls under the influence of the former. In other words, in some climates—some circumstances and conditions in which man is placed, either willingly or unwillingly, knowingly or ignorantly, his health suffers as a *consequence.* If these are changed he regains his health. All *hygienic and sanitary* regulations, all *curative processes* are based upon these principles; without them we are *brutes*—nay worse—for many of

Illustrations.

them apply remedies to ailing conditions. Disease may be considered a *resulting* punishment for an infraction of the laws of health. In civilized communities, where life is highly valued, preventive or corrective laws are made, that this should be avoided, and special bodies are designated to point them out, and see them enforced, and to take care of the health of society, that the great mass are ignorant of; and these are called in our country "Boards of Health," "Health Departments," &c.

Filth the great enemy of health.

The localising conditions consist of filth and impurities of all kinds, in the largest sense, constituting the great physical enemy of the well-being of man, as street and kitchen offal, the refuse of stores, the drainage of sugar and molasses hogsheads, of stables and vacheries, with deficient ventilation, slaughter-houses, soap, tallow and bone manufactories, privies, cemeteries, swamps, and the defective drainage of towns; it is concentrated in hospitals and crowded dwellings, where many diseases originate, and others cannot be cured without removal. It exists, to a proportionate extent, wherever there is a defect of domestic and personal cleanliness; in fine, *whatever impairs the purity of the air we breathe, the food we eat, or the water we drink.* They are all resolvable into the first, for it is through it mainly they obtain access to our aliment and drink, and through the lungs reach the source of all vitalization.

What it is.

It has been as truly as beautifully said,* that though we do not see the air, we feel it, and what is more, we breathe it. We live by breathing it, insomuch that it has been well said, that as plants are the children of the earth, so, men are plants of the air; our lungs being, as it were, roots ramified and expanded in our atmosphere; and this, in fact, is the chief avenue by which the filth and damp of towns that are not well drained and cleaned introduce their poison into the human constitution. The putrifying refuse, whether animal or vegetable, solid or liquid, becomes dissolved into various kinds of gas, all the more commingled with the common air as this is damp and warm. These principally constitute the special difference between the air of urban and rural districts. It is estimated that at least one-third of the life of civilized man and even much more in cities; (nay, if it was reversed, and say that more than two-thirds of our time) is spent in the confined and, to a certain extent, deteriorated atmosphere of houses and apartments, where there necessarily must exist defective ventilation, where the atmosphere has to be breathed over and over again, with all its organic matter running through every stage of decomposition, besides other sources of vitiation, surprise should no longer be felt that a city atmosphere abbreviates human life.

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* Girdlestone.

Indispensable natnre of pure air.

Amount of time spent in the house.

There is a peculiar air hanging over and constituting that of large cities and all extensive aggregations of human beings or animated life. The more sensitive of our race easily perceive it. Asthmatics are sensible of it, on entering or leaving a city,—children—delicate females—convalescents—those in feeble health; indeed, it is experienced by most persons on leaving a close city atmosphere, and particularly if proceeding where one is exposed to the influence of sea air; and this is apparently independent of ventilation, for, although to the *windward* of it you are still sensible of the *city air.* When acting as Chief Health Officer at Vera Cruz, during the Mexican War, it became my duty (as Surgeon U. S. Army and Chief Health Officer) on one occasion, to visit a mariner on board a vessel that had arrived some hours before, and anchored some two or three

Peculiar air of cities.

It spreads everywhere.

miles from the port, to windward. I found it a case of yellow fever, which was then prevailing in Vera Cruz—the vessel having come from a healthy port. She had not communicated with the shore, except through her first officer; so neither the wind nor the officer could have communicated it. It is a curious and well known fact, that oil, thrown upon the waves, will pass to windward as well as to leeward. Such may have been the case in the instance just cited, although I would not wish to be understood to mean, that all ærial poisons are not more readily conveyed by the winds. Indeed, we know they are so. I only desire to express the opinion, that it depends upon a concentrated city atmosphere, which, under certain circumstances, no wind can dilute to innocuousness, it may become diffused by expansion, as the temperature is greater. This is experienced in all large cities; and in all, there are portions where this impure air exists to a much greater extent than in others. This is more eminently true of the Northern cities, where there is such a difference in elevation, dryness and ventilation, than here.

Parts of cities most filthy, and therefore sickly.

Proofs.

Still, there are localities here where these differences exist to a notable degree, and which are the special hot-beds of pestilence wherever it exists, as in the neighborhood of St. Thomas, Madison and St. Mary streets, the triangle, about Gormley's Basin, some of the front streets of Lafayette, and finally, the Seventh Ward. These are damp, filthy, crowded and badly ventilated, and the results are such as should call forth the corrective influence of a paternal government. There is said to be a street in Charleston, never visited by yellow fever, on account of its great cleanliness; and there are healthy and sickly parts of all cities, as we shall by-and-bye point out.

Test of a city's insalubrity when it departs from that of its neighborhood, and shows it to be artificial.

Now, it is evident, the nearer we make a city approach the condition of the rural districts, the nearer it will reach a state of salubrity. Our neighboring parishes had an average mortality, in 1850, of less than two per cent. The average for this city, for the last seven years, has been near seven per cent. The difference is seldom more than 40 per cent., according to the reliable investigations of vital staticians, (between town and country), while here we find it more than 350 per cent. That this enormous difference proceeds from removable causes, will be shown hereafter. There are few cities but what would be ultimately depopulated, did they solely rely upon their own native population for increase, from the results of the concentration of their own filth and congenerous sources of vital degeneration. All, and especially sickly cities, owe more or less to immigration, their growth and progress. Hence, their special value to us, as important means for our advancement and prosperity.

Amount of air required for respiration.

Every time we breathe, and this is repeated about eighteen times per minute, we vitiate the air taken into the lungs, by retaining a portion of one of its constituent elements, which combines with our blood, refreshing and purifying it—rendering it fit for the purposes of life—whilst we return, the remainder, with an additional ingredient, quite unfit to be breathed over again, either by ourselves or any one else. Hence it follows, that were a person shut up in a small chamber, perfectly air tight, he could not live through a single day. Each individual in the course of the night, vitiates about three hundred cubic feet of atmospheric air, rendering it totally unsuitable for the purposes of respiration; and no room should be tenanted that does not furnish *at least* six hundred cubic feet of air to each individual occupant. The inspectors of prisons in England recommended not less than one thousand cubic feet for every prisoner, as being "essential to health and preservation." It is known, that a canary bird, suspended near the top of a curtained bedstead in which people have slept, will generally, owing to the impurity of the air, be found dead in the morning. And it is computed that the population of a crowded town, by the mere natural action of the lungs, in the course of twenty-four hours, vitiate a layer of air as large as the whole area inhabited, at least a yard in depth or thickness—to say nothing of the amount spoiled for all the purposes of respiration by fires and furnaces, lamps, candles, gas and all manner of deleterious manufactories. Indeed, were it not for the provi-

Size of rooms.

Amount of air vitiated in a crowded town per day.

Absolute necessity of ventilation.

How promote this.

dential arrangement, that the air thus vitiated by the lungs becomes at the same time heated, and is therefore always in motion to ascend, making way for fresh air to take its place, we should be in constant danger of suffocation whenever we were in a room without a draft, or in a town without a wind stirring. This shows us the importance of so constructing streets and courts as to make the most of the *natural movements* of the atmosphere in the climate in which the town is built. For instance, in this city, to obtain the most perfect ventilation of our streets and thoroughfares, during the summer and autumnal months—the most important period, when our salubrity is most liable to be influenced by bad air—the streets should, were it possible, run East and West and North and South, and always be at right angles, to prevent obstruction and permit perfect ventilation.*

Necessity of drainage.

Diseases not from defective food and clothing among the poor, but from crowding and filth.

Cost of removing filth but a small part of the annual cost to relieve,

These valuable reports are so full of important practical matter, and so applicable to our situation, that I am tempted to quote extensively from them. It is proved by them, "That the rate of sickness and mortality, of the working classes in their populous towns, is much greater than that of the same class in the country districts, and much greater than that of these classes in the same towns, where dwellings are better drained and better ventilated. It is proved, that the greater liability of the working classes to the most afflictive and painful disorders, does not arise from deficiency of food and clothing, but from their living, usually with no alternation, in narrow streets, confined courts, damp dwellings and close chambers, undrained, unventilated, uncleaned. It is proved, that they suffer most severely in those cases where they spend the day in crowded workshops, or where they live in cellars, or sleep in rooms on the ground floor, or in chambers that have no chimney place, or other vent for vitiated air. It is proved, that in such situations, the average duration of human life, is at least twenty years less than it otherwise might be; and that, during this curtailed period of existence, the working power of those who live, is seriously diminished, and much more in their capacity for enjoyment, by a constant depression of spirits and health, and by the active attacks of fever, cholera, scrofula, and consumption. It is proved, that this excess of mortality falls most heavily—first, on the infantile portion of the community, and next, on the heads of families, between twenty and thirty years of age. It is proved that the burdens which are thrown by this excess of sickness and mortality on the poor's rates—to say nothing of infirmaries and dispensaries—of friendly societies and of private almsgiving, is such as to exceed the cost of effecting those improvements which would suffice to make the average health of the working classes nearly equal to that of the rest of the community. And it is further proved, that there is an incalculable amount of demoralization, attributable to the same causes, and that an effectual bar is thus put to the intellectual, moral, and religious improvement of this large portion of the community."

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* Vide Report General Board of Health of England,—and table of the Winds here.

Resulting demoralization.

The influence of crowding, production of bad air, and the want of ventilation, is eminently illustrated on the crews of collier vessels on the Thames—although well fed, in the prime of life, confined at night and in bad weather to the narrow limits of the forecastle, the sickness and mortality is large. Such is the cause, also, mainly, of the immense mortality on board immigrant ships, crossing the Atlantic. In Northern latitudes they die of typhus and cholera; in tropical climates of yellow fever, and the mortality, everywhere, has been proved to bear a pretty accurate proportion to the closeness of the crowding. The deleterious agent, consisting of the effete excretions, has been proved, experimentally, to consist of highly putrescent organic matter, mingled with the expired air. That it is, when re-introduced into the living body, liable to be highly injurious, may be inferred from the fact of the careful provision made by nature for its incessant elimination from the system. That it is small in amount, is no objection to the intensity of its

The poison from crowding is organic matter as well as carbonic acid.

action; for to the physiologist it is well known, that a minute quantity of a powerful agent—the putrid matter introduced on the point of a needle, in the inspection of a dead body—a single drop of concentrated prussic acid, placed in the mouth of an animal, is sufficient to destroy life. It is in our crowded bed-rooms, in unventilated schools, upper dormitories, in overcharged wards of hospitals and jails, that this effete matter taints the air, and, entering the blood, poisons the system.* It has been before said, that this expired air consists of two ingredients—carbonic acid, which mixes with the atmosphere, on the principle of diffusion, whilst the other, being an animal excretion, no longer held in solution in the colder external air, is deposited and particularly clings to woolen articles or bedding—clothes which are well known to retain this offensive smell a long time. Hence the value of frequently airing these domestic articles.

Comparison of air with food.

In an examination before a committee of the House of Commons, the venerable Dr. Farr had occasion to state, the relative value of pure atmospheric air, as vital food to the grosser elements of bread, flesh and water, and said, most forcibly: "If a human being be deprived of these aliments, he dies in a period varying from eleven to nineteen days; but, if atmospheric air be excluded from his lungs, he dies in a minute; therefore, the relative value of atmospheric air to bread, flesh and water, is as fourteen days to one minute, and the *deterioration* of the atmosphere in which human beings are residing, produces a deleterious effect on life, in proportion to that deterioration."

Necessity of ventilation.

The necessity of *ventilation*, and the injurious effect of a stagnant state of the air, has been noticed as far back, by medical writers, as the time of Hippocrates. By reference to the Table of the "hygrometry of the winds," it will be seen, that while it is *calm*, that it is most replete and of course, with all that moisture can dissolve or hold in suspension, and that, consequently, active perflation is indispensable to purification. It is well known that where the wind blows freely and strongly, or finds no obstacles from surrounding objects, localities, which otherwise might be expected to be fruitful sources of fever, may be visited or inhabited with impunity, while similar places become insalubrious if the air is stagnant.* "Calms," says Dr. Drake, "permit the exhalations from foul localities to accumulate in the atmosphere which rest over them; but all winds operate to disperse and dilute them with purer air." The late Professor Hallè, one of the magnates of the Medical School of Paris, in an able report on the condition of the river Bievre, near that city, pointed out the fact, that the pernicious effect of the fœtid exhalations issuing from the river, are harmless in situations, where the atmosphere circulates freely, and is renewed by strong and unimpeded currents. †

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* Granger.

Organic matter always in air.

In the proceedings of the British Association, we find an interesting report by Dr. Smith, on the air and water of towns, which is too important, from its direct applicability to the subject before us, to pass over without culling a portion of its interesting matter. "If," says he, "air is passed through water, a certain amount of organic matter poured off from the lungs, is to be detected in it." By continuing this process for three months, Dr. Smith detected sulphuric acid, chlorine, and a substance resembling impure albumen. These substances are constantly being condensed upon cold bodies, and in a warm atmosphere, the albuminous matter very soon putrefies, and emits disagreeable odors; this is the ordinary smell of close rooms, producing offensiveness, when space is disproportioned to the number of occupants. Such was eminently the case last season, in yellow fever rooms, when not properly ventilated. By eramucausis, this substance gives rise to carbonic acid, ammonia, sulphuretted hydrogen, and probably to other gases. By collecting the moisture of a crowded room by means of cold glasses, and also dew, in the open air, it was proved that the former was thick and oily, capable of decomposition, and productive of animalcules, while the dew was beautifully clear and limpid. Large quantities of rain water have been examined by Dr. Smith, and he says: "I am now satisfied that dust comes down from the purest air, and that it is simply coal ashes." The rain water of Manchester is considerably harder than that of the neighboring hills. This can only arise from the ingredients obtained in the town atmosphere; but the most curious point is the fact, that organic matter *is never absent*, although the rain continues for several days. The state of the air is closely connected with that of the water; what the air contains, the water may absorb, and what the water has dissolved or absorbed, it may give out to the air. It was discovered that all organic matter in filtering through the soil, is very rapidly oxidized. The nitrates he found in the London water, prevent the formation of any vegetable matter, so that none can be detected, even by the microscope, after a long period. In summing up the results obtained; Dr. Smith remarked, that the pollution of the air in crowded rooms, is really owing to organic matter, and not merely to carbonic acid, that all the water of large towns contain organic matter; that water purifies itself from organic matter, in various ways, but principally by converting it into nitrates—that water can never stand long with advantage, unless on a large scale, and should be used when collected, or as soon as filtered.

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* La Roche. † La Roche.

Notwithstanding rains.

Water absorbs whatever air contains.

Water rapidly absorbs noxious gases, and is always injured when exposed to their influence. In this city the cisterns which usually furnish most of our drinking and cooking water are commonly placed in close proximity, in our narrow back yards, with the privy, bituminous coal, and all kitchen and house refuse, and sometimes becomes so much impaired in its purity as to be utterly unfit for use. Professor Hoffman has stated that such is the capacity of water that one thousand gallons of it will dissolve twenty-five gallons of nitrogen, one thousand gallons of carbonic acid,* fifty thousand gallons of ammonia, the very gas which escapes so largely from privies, and the police filth of every dirty town, carrying with it vegetable and animal matters in a high state

Absorptive power of water.

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* Grainger.

of putrescency. From hence it will be seen how important it is that the drinking water, and that used for domestic purposes, should be brought *underground* from the *rural districts* at a distance, and that the plan suggested on the erection of the British House of Parliament, to ventilate the building by the introduction of *air from the country*, was a very wise one.

Value of rain water if kept pure.

Experience has already shown that those who use rain water in preference to *any other*, and more especially, filtered river water, are much less subject to *cholera* when it prevails, than those who use any other kind of water, and of course, it follows in congenerous affections, as diarrhœa, dysentery, the bowel complaints of children, &c., indeed, experienced men are so well aware of this, as sometimes, to have the water *boiled*, they allow their sick in some delicate disturbances of the digestive organs, and keep it well corked for use. The effect of boiling it, is to purify it, by removing the noxious gases it contains, and for the deposit of its principal earthy materials. In large cities where the water is very apt to be impure, it can scarcely be used alone, hence the temptation to mix it with alcoholic beverages, giving grounds and furnishing temptation to intemperance, and it is a valid one. To support this holy cause then, and to keep up the healthy habit of drinking water alone, the water must be kept pure. The real and true relation, between moral and physical degradation, is now beginning to be correctly appreciated under the improved sanitary states of all classes of society, and the important truth is being demonstrated, that the moral as well as the physical condition may be greatly ameliorated. Ministers of the law, as well as of religion are discovering that the scavenger and the architect are among their best allies.*

Moral and physical condition dependent on similar circumstances.

How food injured.

Food is injured by bad air, and more particularly by moisture, as flour and all the ceralia—meat by moulding, and speedy putrefaction, and salt food, as fish, pork, &c., by the salt attracting the moisture of the atmosphere, and liquifying. Sugar and molasses also attract moisture, and are injured by heat, ferment and become acescent, run off and impair the purity of the atmosphere, and thus all are injured by the climate, and add their mite to impair the general salubrity.

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* Rogers.

Injuries resulting from cemeteries.

There is probably no climate in America where the vicinage of *cemeteries* would and does do, so much damage to public health, as here.* Rapid and prolonged decay results from the great moisture of the climate, and comparatively small desiccative power. Burying, almost universally above ground, (in the cemeteries of the city) the mortar connecting the brick work soon splits, giving exit to injurious exhalations from the within decompositions. The force of the gases (and especially under the augmented temperature of summer, when they are most injurious) are often so very great as sometimes to burst the leaden coffins, (when made of it,) and always to escape through the pores of the wooden ones, and to split the metalic ones and the brick and plastered work of the vaults, contaminating the atmosphere for a great distance around. In no case then, if permitted in cities, should a dwelling be permitted nearer to these yards than several hundred paces, according to the frequency of interment.

How soon bodies decay.

The period in which the body is undergoing decomposition, varies according to its age and size, the season, and the more or less exposure and completeness of the tomb. The sextons inform me, that three to six months is an average period. Let it be longer or shorter, the process is constantly taking place, and any visitor to the grave-yards can easily satisfy himself that the confinement of the decomposing bodies is too imperfect for the safety of the community. In those countries where tombs are not used, the body is disturbed for the repetition of the interment, before it shall have become indistinguishable from the soil.

Number of bodies to the acre annually.

The amount of space recommended in countries more regardful of the public health than here is that there should not be much above one hundred burials annually in an acre of ground. In some of our cemeteries in and near the city, that do not embrace many acres, thousands are buried in every year.†

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* See Map. † See Cemetery Report—Table G.

The following regulation, (introduced by Lord Palmerston,) which is in force in the burial grounds of London, is eminently applicable to those in this city, if they are to remain, and those without the city, that "no interment shall take place within ten yards of any part of the boundary of the city cemetery, and that the intervening space shall be planted with shrubs, evergreens and trees, in such a manner as shall promote the absorption of any deleterious emanations, and at the same time permit the circulation of the air. Also, that the cemetery shall be underdrained, so as to prevent the accumulation of water in the graves and vaults, and that no grave shall be opened until after a lapse of fifteen to twenty-four years, according to the age of the parties."

Regulations in London.

The sentiment now almost universally prevails, that intramural interments should be forbidden, as no less inconsistent with due respect to the remains of the dead, than with a safe regard to the health of the living; and that, as perfectly compatible with both, the beautiful custom, so full of delicacy and taste, so accordant with some of our most sacred feelings, should be encouraged, of erecting rural cemeteries, on spots retired, and distant from the busy hum of human intercourse that the holy feelings due to the last remains of our kindred and fellow-citizens should not be obtruded on by either levity or business, but be in harmonious association with that beautiful kingdom that God has made for our comfort and enjoyment.

Intra-mural interments substituted in rural cemeteries.

Probably, there is no cause so productive of bad air, and so difficult to be gotten rid of here, as NIGHT SOIL and *street and back yard filth.* It is *the great difficulty* everywhere. In this city, we are peculiarly situated in regard to both; we cannot dig pits of more than two feet anywhere without coming to water, and in the back parts of the city, to half that distance, this being dependent mostly upon the amount of rain recently fallen, not on the height of the river, as supposed. This makes it the worse, as in the summer season most rain falls, and the evolution of the gases greatest and most injurious. Hence, open pits (as night soil is lighter

Amount of filth exposed to constantly, and to be disposed of.

The area of the city temperature and moisture.

than water, and is always on the surface, giving its noxious gases to the atmosphere) are not applicable to our position; and street filth is not required for manure in our fine alluvial soil. If we reflect for one moment upon the offensive fact, that near five thousand six hundred tons of night soil, and about fifty thousand tons of urine are exposed here annually, to undergo the process of fermentation and decomposition, exhaling their noxious and poisonous gases to the atmosphere we breathe, and absorbed by the water we drink, contaminating our most private recesses, (for there they are generally located,) where the air being mostly stagnant, it is apt to remain permanently. The amount of manure from domestic animals, of kitchen offal, is at least as much more—of more than five thousand bodies, buried within the city limits—of street and gutter filth, constantly undergoing decomposition—with its frequent *upturning and spread upon the streets*, (not *immediately* removed, however, as it should be,) by the scavengers—probably, four times as much more. Then, we have the frightful aggregate of upwards of three hundred thousand tons, the larger part of it of organic decomposed and decomposable matter, submitted to the putrefactive fermentation every year, under our very noses, besides that from gas works, tallow and soap chandleries, &c., &c., in an area of seven and a quarter square miles, together with the baneful influence in almost every direction, of swamps uncovered and covered by forest growth, and all this in a temperature which, for nine months in the year averages 73°.31, while there is an average humidity during that period of .820, or within .179 of actual saturation! This is bad enough if it cannot be remedied, and too bad if it can!

On investigation by the General Board of Health of England, on the influence of *livery stables and vacheries*, they were found to be so injurious as to be denominated "fever nests," and so pernicious even to their own tenants (cattle) that the manure was ordered to be kept in covered receptacles; and in relation to slaughter-houses, they were found not only injurious to health, and offensive to sight and smell, but the poisonous atmosphere was even found to injure the quality of the meat, disposing it to taint, and promoting its rapid putrefaction. In some of these houses, the meat would scarcely keep sweet thirty hours, and such I have found to be, on inquiry, a general fact here.

The special gases, the principal effluvia eliminated from privies and the other sources of vitiation just mentioned, is known to be composed, mainly of sulphuretted hydrogen and ammonia, and experimental physiology* has shown that one cubic inch of this gas, in 1500 cubic inches of air, will kill a *bird*, and one cubic inch in 800, will kill a *dog*, and that a *man* cannot live, where the air he inspires is impregnated with a 300th part, and suffers in a corresponding degree when a less proportion of these poisonous gases exist. Matteuci informs us, that sulphuretted hydrogen is the only body, which, having acted on the blood, even in very small quantities, renders this fluid incapable of being arterialized by oxygen.

Amount of this gas to poison a bird.

A dog.

A man.

Streets, as a source of disease, are much dependant upon the qualities of the soil of which they are composed. If sandy, although to the eye, cleaner, they *absorb and retain* all the filthy materials of a liquid nature, that falls upon them, until an elevated temperature gives them back to the surface, in the more, and indeed, only poisonous condition of an æriform compound: this, it is well known, constitutes the most dangerous ballast of ships, and it is from this cause. The "cleanliness" of such streets, is illusive—deceiving, by appearances, their vicious deposits—*concealed*, *not destroyed*. Streets of clayey materials and partly of sand and vegetable mould, such as compose our streets, whose absorbent power is less, retain, on the irregularities of the surface, what is not absorbed or passed off, and exhale it to the atmosphere, keeping up a high degree of saturation, with it in solution.

Streets as a source of disease.

What good and bad.

Houses, in a climate like ours, should be so constructed as to promote the maximum of ventilation and the minimum of moisture and temperature. Where these are not fulfilled, with a proper protection from the inclemencies of the weather, (hot

Houses.

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* Thenard & Dupuytren.

How to be constructed.

and cold) they fail in their objects. The admission of light, too, is important in the construction of a dwelling, to the enjoyment of health and the prevention of disease. It renders disease milder when it occurs, and makes it more readily amenable to medical and other treatment. There is reputable medical testimony to prove, that some diseases, in dark alleys and cellars cannot be cured, without it. Dark corners and places in dwellings are always the hiding places of dirt and filth, and particularly in the habitations of the poor.

Empty lots as a source of disease.

Our *empty squares and half filled lots*, are pregnant sources of disease. These require as much, or more, attention than streets, as they *are eight or ten times* more extensive and more replete with every kind of filth. Often, in secluded, unventilated spots, they constitute so many receptacles and fountains for the evolution of that poisonous material that is so fatal to the public health. Hence then, the vigilance of the authorities is ten-fold more required *there*, than in the streets, where so much negligence takes place before the very eyes of the community. Little is done (while they are neglected) to purify the atmosphere, if these efforts, limited and spasmodic as they are, shall be confined to the streets, if they should be left to private apathy and indifference.

The true miasm is whatever impairs the purity of the air.

The various hypotheses based upon the supposition of a *specific* something, which is denominated MIASM, eliminated by the decomposition of organic matter has been shown to be so utterly untenable by its several opponents respectively, of any *one thing* possessing this multifarious and mighty power, that we have for many years abandoned the whole as untenable, and that of the "drying power," among the rest, which, having nothing definite in the form of reasonable experiment to support it, or rather in defiance of it, and in the very face of experiments which utterly disprove it, that I have long come to the conclusion that there is no such *specific agent*, but believe them all right and all wrong, when exclusive, and that *whatever impairs the purity of the atmosphere is pro tanto*, for the time being, *the miasm*, or rather the *mal-aria*. In a practical report, such as the present is intended to be, it is no place to offer the the explanations which have satisfied my mind in relation to what is called the "*laws of miasm.*" We profess to deal with well established and incontrovertible facts and to make them the basis of all our suggestions for future improvement; we may, nevertheless, be pardoned if we find it requisite *for necessary explanation*, to exercise the privileges belonging to the first advance in science, and brush away the cobwebs, and show what this alledged cause *is not.* We then proceed to show that the explanation which they have attempted, in relation to the *disturbance of the soil*, is utterly irreconcilable with the facts, and *it is for that purpose* that we depart from the purpose laid down for our guidance in this paper.

Supposed cause of fevers.

The cause of this influence, indeed the cause of all what is called *malarious* fevers, (bilious and yellow fevers inclusive) has been ascribed to "the *drying process*" in soils recently or not long since saturated with water, without direct proof, with no allegation of experiments, and with no other evidence than that there "has been a hot sun and preceding moisture." Now, I might content myself in stating, that the hygrometer is the only recognized suffcient test of the existence of this "*drying power*," *and the amount of moisture in the atmosphere*, and there is neither allegation or evidence that this has been used. That when these injurious influences take place in the *highest degree*, *the drying power is at its minimum*, and that the moisture is usually then at its maximum; the meteorological tables accompanying this Report, show this in a most conclusive manner.

No proof.

Explanation of Dr. Ferguson's hypothesis.

The main ground furnished by Dr. Ferguson, who is the author of the hypothesis, is, that during the period of a great drought in the hilly districts of Spain, the streams were dried up, and the British troops were encamped in their beds and hollows, (I quote from memory,) and so fatal was the fever resulting, that all Europe thought they were annihilated! To experienced Southern physicians it is well known that there are *no places* so fatal to health as these beds and similar apparently *dry hollows and their outlets*, and that it is in proportion to their insulation from ventilation, and that it consists of a stagnant, damp and poisonous air; that it was this that was so fatal to the British army, and not the drying process. There is no doubt that if the Dr. had experimented with the hygrometer it would have informed him that the air was *saturated with moisture* during the greater part of every night, and that if he had dug into the beds of the late streams he would have found water not far distant.

Solution required for absorption into the system.

All the theories of miasm singularly fail, in attempting to prove too much. A specific miasm, eliminated by decomposition out of organic matter, must and should, as is alledged, produce disease under all circumstances; so far as lining the lungs it is composed of organic matter, passing the most delicate membranes into the system, is deemed utterly incompatible with that demonstration made by our able colleague,* viz: that nothing can pass through those membranes *unless in a state of solution*, in which state the organic character must be lost! the physiological condition of the individual, and the existing meteorological state being entirely out of the question.

Why it can't be the "drying power."

So from a physiological cause, or hygrometric.

The advocates, however, of the influence of the "drying power," do not so interpret the modus operandi of their agent, nor present us the philosophy of it. Malignant fever is most apt to seize an individual about daybreak. This is supposed to be owing to an alledged great fall in the thermometer at that time, instead of ascribing it to a change in the *physiological condition of the individual then always occurring.* The most frequent hours for the attack of malignant disease (yellow fever, cholera, plague, &c.) being after midnight, or early morning hours, *being precisely those periods* known from statistical investigations, as most fatal to human life, or when it is most apt to terminate, three to six. The real difference between bed-time and day-break is only three to four degrees, by *actual observation*, and this, too, is always a *gradual, regular decline.* Now, if it is due to any meteorological condition, it is to the hygrometer, for I have often noted a difference of half a degree in the temperature of evaporation between day-break, my usual time of making it, and half an hour to an hour before; that it is that much *lower;* the evaporating power is that much greater; that it rises at daybreak; while I can perceive no difference in the dry bulb thermometer, placed by its side. Again, a fall, a moral emotion, anything that suddenly shocks the nervous system, and particularly, during the existence of a mortal epidemic, produces the development of the disease, although, but for this, no such occurrence would probably have happened. The "drying power" is most active at midday, and is at its minimum at night, when the air is almost saturated with moisture, and often entirely so in sickly seasons, as during our epidemic last season, yet, yellow fever, as well as the whole zymotic class, is very apt to occur at this time, and in seasons and regions where this exists in the greatest degree, is precisely there where they are most rife, and where the *drying power is greatest, and the air elastic, is just those where there is most health!* During the greatest droughts, there is always a provision of nature in the subsoil for the necessary supply of moisture, as well as in the atmosphere. The term is but one of comparison; were there *no moisture* existing at the time, vegetable as well as animal life must cease. I have often noted, during what was called great droughts, the air, at my morning observation, *saturated with moisture*, and during the "dry season," on the elevated plateaux of Mexico, I have seen the dews so heavy as to wet the road half an inch or more in depth, which at first I attributed to rains during the night, and many a time have I descended from my horse at daybreak to examine it. The country is rarely sickly when simply dry. The driest portions of the Southwestern States are the healthiest, as may be seen by reference to the maps I have constructed of those States, derived from the mortuary returns of the last census, and published in the fifth volume of the Transactions of the Am. Med. Ass. Pensacola, Mobile, Bay St. Louis are dry more in appearance than in reality.* Their absorbent soils permit a percolation of water to the clayey subsoil, but a few feet below, beyond which

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*Prof. Riddell.

Always moisture in the atmosphere.

Absorbant soils only apparently cleanly.

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*I have tried for years, in vain, to procure a record of their hygrometrical condition.

it cannot proceed, and it then becomes a reservoir for an evaporating temperature, whenever this occurs. That this is reasonable, is demonstrable from what we know of subsoil moisture under a high temperature. I know it further from my own experiments. That this was the case at the disastrous encampment at Walcheren, where the moisture could be easily reached by thrusting a walking cane into the sand, and the notoriously fatal spot opposite Lisbon is as remarkable for its luxuriant mushrooms as for its mortality, and we very well know that these flourish only in very moist situations. The periods and places of the occurrence of the epidemic of last year, as traced out in Prof. Blodget's interesting communication, showed most conclusively, that the epidemic, only broke out as the country became moist, that as long as it continued dry, whatever was the temperature, and it was very elevated, health remained; and finally, what is better established, from long and well attested experience, than that one of the most prolific sources of foul air and bad smell in ships, has been the putrescent matters absorbed and retained by gravel, sand and other earthy substances used for ballast, and that however apparently clean ships are kept by washing, they are never as healthy as when this process is effected by dry rubbing by the "holy stone," as it is called. The "drying process" always exists in the proverbially healthy occupation of ploughing, which is only injurious during the *first* process or year of exposure. The simoon is a *drying blast.* It sucks up our fluids, and desiccates everything it reaches, but it has never been accused, so far as I have heard, of producing *fever*, much less *yellow fever*. Nevertheless, I so far agree with these gentlemen as to ascribe much influence to the drying power in the production of influenza, pneumonia, catarrh, rheumatism, and even *cholera*, &c., but so far as my experience and researches have gone, not bilious or yellow fevers, and these experiments have extended over many years and climates, and during the worst fevers known in the South.

Conceals, not destroys filth.

Healthy as long as dry.

Let us repeat, then, our conviction, that *no one agent* produces what is termed malarial fevers, but that they depend for their existence upon *the two-fold condition* expressed in the former part of this Report.

A two-fold condition requisite.

A fundamental proposition, an imposing truism of sanitary science, is, that every effect springs from some adequate and commensurate cause. This is a law of nature, as applicable to disease as to anything else. No disease can arise and pervade a country, or section of country, or even attack a single individual, without being due to some atmospheric, local or personal cause, the discovery and extirpation of which will at once arrest its further diffusion. The curative physician seeks for the causes of disease, for the purpose of more thoroughly comprehending their mode of action upon the human economy* in order to apply the proper remedy. The sanitary reformer pushes his inquiries into the "field of causation," for the purpose of *preventing* those ills which it is the province of the other to palliate or *cure.* The one endeavors to ameliorate the ills to which individuals at present prove subject, while the other has a far nobler, and philanthropic object, to prevent the ills to which whole communities are subject.

No effect can arise but from an adequate cause.

Difference of curative and preventive science.

If, in the present state of this interesting inquiry into general and special causes, we find certain effects invariably to follow, and in the same relation, it requires no great sagacity to ascribe the one to the other; nor any rare gift of prophecy, to foretell that, on the occurrence of the one, we may reasonably expect the other. Such are the circumstances that characterize the occurrence of yellow fever in this climate, the *invariable sequence* to *extensive* disturbance of the original soil, with the atmospheric and local conditions to be pointed out in more detail presently. There are many diseases with whose causes we are utterly ignorant, at present, but with which we shall doubtless become acquainted hereafter in proportion as we acquire a more accurate and minute acquaintance with the laws and constitution of the atmosphere of the climate we live in, and with the physiology of organic

Cause and consequence.

Must be a cause for every disease.

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*Rodgers.

life. It is thus with leprosy, elephantisis, syphilis, and most of those now recognized as due to specific poisons. In relation to epideme cholera, we may be ignorant of its precise cause, but in the progresss of a study of the conditions which influence it, we will become acquainted with the accessory, preventible and instigating local circumstances which *influence* it, the localising circumstances that are *under our control.* So of yellow fever; the *exact* amount of causation, either local or general, the *sine qua non*, to its production, we can scarcely measure, from defect of accurate and precise observation; yet I am most fully impressed with the conviction that we are sufficiently acquainted with its ordinary causes to *prevent it,* which is the only valuable or practical part worth knowing. If we can control these then, we shall be exempt from this terrible scourge. It is particularly here that false facts and imperfect information have done so much injury, and thrown a cloud upon the subject it is so difficult to dispel. If then, we can clearly prove the *places, the very spots and parts of cities* that are the favorite haunts, *nidus, birth-place and field of growth of this disease, if with increase of the alledged cause, the effect is in proportion multiplied, if with its limitation the effect is also limited,* and if with this removed the effects also cease it will go far to show, not only the *cause* of the disease itself, but of its *preventives,* and will prove a valuable lesson to us, worth all the theories and hypotheses of visionary dreamers from the time of Paracelsus to the present day. A careful inquiry into the facts will I trust, satisfy all fair minds that the common sense of mankind has not been mistaken in attributing the prevalence of this disease to the causes mentioned, not only here but abroad. The record presented in the Chart, ought, I humbly conceive, convince all. The Sanitary Map of the city will show the influence of these localising conditions. No city that we are acquainted with but has these infected spots. The main peculiarities which distinguish them, are filth of every kind, moisture, stagnant air, heat, and a crowded population, aided by the

And as much of that of epidemic yellow fever as any other.

Because we can trace its origin and the causes producing it.

accessory circumstances of intemperance and bad habits. They are usually situated in those parts of cities where filth is most apt to accumulate. In Northern cities, with a declivity to the river, or part about the wharves, as in the neighborhood of "Fort Hill," as it is called, in Boston, has been its hot-bed there from time immemorial; so about the "slips" and wharves and docks in New York, Philadelphia and Baltimore, where are the egresses of their filthy sewers—the concentration of all the polluting detritus of these cities. And so of the "infected districts in Norfolk, which is confined to a space of two or three hundred yards, and mostly made ground." And so of the most parts of Charleston and Savannah. In New Orleans it is not limited, as it is in them, to these localities. It, however, exists here on the river bank, because at this season (August and September) the river is low and the bank exposed, leaving an extensive surface—the common receptacle of all kinds of filth—and here, or not far distant, we find the large amount of unacclimated population; but it first breaks out and spreads in St. Thomas and Madison streets, St. Mary street, about the Markets, at the triangle, Gormley's Basin, &c. &c., (see map, as before mentioned)—*all filthy, crowded and badly ventilated localities.* These are plague spots—they exist in all cities that are badly policed—the sores first fester and mature here, and the bad air or virus is generated and multiplied as the season advances—extends to the neighborhood, and if it meet with a congenial atmosphere, throughout the city—and from an endemic of a locality, it becomes, with concurring causes, a wide spread epidemic. If otherwise, if a more dry or less impure air is met with—if more attention has been paid to sanitary measures—it is more limited, and its progress can sometimes be measured as to its surface, extent and even height, day by day. Such has been the result of experience in New York, and measurably in Philadelphia, and the "infected district" can be and has been "fenced out," and its gradual extension actually calculated as so many feet per day. This cannot be

Seats of these causes in all large cities.

Why limited.

And how extended.

shown here for two reasons: 1st, because these conditions themselves are always more or less combined and extensive; and 2d, the presence of an unacclimated population would prevent its being so clearly shown. It exists in the air—it is the consequence of the causes mentioned—it is the poisoned, infected atmosphere, and not individual—not contagion. A person taking it in the infected spot, and going into a pure atmosphere, has never been known to extend it. If it is taken to a congenial atmosphere, it contributes to its further extension. In this city and in the country during the last year, there existed an epidemic influence (as formerly explained); the congenial atmosphere was nearly everywhere, more or less aggravated by localising circumstances, and the disease spread extensively, and more particularly where those localising conditions existed in excess, (as above mentioned.) This was the case, too, at Algiers, where the disease has not extensively prevailed many years, (although only across the river), produced by extensive disturbance of the soil, for railroad purposes, and followed by a large mortality throughout the village. These localising conditions existed, probably, *everywhere.* Many of them have been mentioned in a former page. For the sake of the verity of history, and for the inestimable value they promise for the future, a full and scrutinizing investigation should extend over the entire region that was reached by this disastrous epidemic, that *all* the facts be collected and recorded, and promptly, too, before oblivious memories and fabulous statements shall bring to doubt the real features, and the authentic history of this remarkable year be lost, and we realize, in after times, as opposite and parallel to most those in Carpenter's work on the yellow fever of this country—mostly made up of a tissue of statements, both at home and abroad—that have been exposed and refuted over and over again—many of which are personally known to me to be without any real foundation, of which I had made record at the time of their occurrence. It has been also proved from the embarrassment the Commis-

Statements to be of future value should be made up at once.

sion has met with in eviscerating the real facts, even from the more recent transactions of last summer.

Nor is the rocky post of Gibraltar an exception to the requirement of a localising condition from filth, &c., for the production of yellow fever. Although it has the appearance of great cleanliness without, as all military stations have, yet within, the houses are admitted to be, and are notorious for their filth, crowdedness, and want of ventilation, and even the disturbance of the earth in the vicinity, has been noticed to have had a most injurious influence on the public health. "Two successive epidemics of yellow fever, namely those of 1804 and 1813, broke out in the same spot, the dirtiest in Gibraltar, Boyd's buildings, and the epidemic of 1814 broke out at Cavellero's buildings, a place which competed with Boyd's in its state of filth and pollution." "Whenever," says Mr. Armil, "the epidemic breaks out in Gibraltar, it has always commenced in the filthiest spot and this was the case in the late visitation." The same facts have been demonstrated by the best authority, to exist at Barbadoes, Jamaica, and other parts of the West Indies, at Demarara, &c.

Gibraltar very filthy within the houses, and crowded.

The city of Havana is situated on a closed bay of six or eight miles in circumference, land-locked on every side with lofty hills, with the exception of one narrow outlet to the sea, at the North, with marshes about the estuaries of the several small streams that empty into it, bringing the organic detritus of the surrounding country, mixing its fresh with the salt water of the ocean, occupying near two-thirds of the marginal circumference of the bay. This bay receives all the filth of a city containing near two hundred thousand inhabitants—is in many places very shallow, exposing, at low tide, (the tide here being three to four feet) extensive surface, with all kinds of putrefiable materials, to the sun. The water of the bay is often very offensive. All vessels pump their bilge water into it. It cannot be changed; it is so full of decomposing materials that the British naval service has a standing order not to use the water for any purpose on board their ships of war. From experiments made with it, it putrefies

Bay of Havana.

Causes

Of the insalubrity of the city.

on standing a *single* day, while sea water taken at a distance of fifty leagues from land, requires *three* days. The streets of the city proper are very narrow, (about twelve feet wide,) and very badly ventilated, from being irregular, and very crooked, and there is a high wall still further obstructing it. The habits of the mass of the people are of the very worst description, and from the high price of food of every kind, (from the heavy tariff imposition of a despotic government,) the mode of living is wretched in the extreme. That yellow fever should exist here every year, is not at all astonishing, with a high temperature and great moisture. It has even been contemplated to make another avenue to the sea, so as to produce a current and occasional change of water in the bay, which would prove a most salutary measure.

Description of Vera Cruz.

Vera Cruz, although built upon a sandy plain, is but a few feet above the level of the sea. The wells are from six to eight feet deep. There are extensive swamps and low grounds around it, emptying their sluggish currents into the sea, under its very walls; impairing its qualities so much, that, together with the filth of the city, which is emptied into it, it is in the same condition as that noticed above in the bay of Havana, and during the rainy season (the sickly season) ponds are formed in other directions outside the walls. These are about fifteen feet high, and materially obstruct the ventilation of the city, and have been found to be so injurious to the public health, that I deemed it an act of duty to solicit its removal to windward or seaward, so as to permit perflation from that quarter during the summer season (of 1847.) The habits of the lower orders are extremely filthy, and the public quarters and forts, when taken possession of by the American army, could not be exceeded in filth. That this should be a chosen seat for the yellow fever is not at all astonishing. I possess the official records to show its influence on the denizens, and on the Mexican army for a number of years, which I will state in another page when I come to show the influence of sanitary measures on sickly cities.—

Cause of its unhealthiness.

Let it suffice now to say that it has fully earned the reputation of being one of the most sickly cities in the yellow fever region.*

I state, then, as a universal fact, with the *exceptio probat regulam*, that filth of every kind, with heat and moisture, with sufficient duration, produces yellow fever. The records upon the subject are so affluent, they absolutely so crowd the historiesof the disease, that it is really embarrassing to select from them, and many volumes would not suffice to trace and embody them.

Cause of yellow fever.

Finally, and to leave not a doubt upon the subject, if we can produce instances of the presence of yellow fever, where there has been *no possible intercourse or communication from abroad*, or from any *extraneous sources* whatever, as far as human scrutiny could ascertain, should not the most skeptical yield up their doubts, provided we can satisfactorily ascertain and point out the existence of the causes and conditions I have alledged. It is through such demonstration that we reach and develop the important and impressive truth, that in the concentrated filth which localises it within the geographical limits of its range, (though it has been sometimes assumed to have had a foreign origin,) we present

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* The causes productive of yellow fever, are so thoroughly understood by all those who have practiced much, and long, in tropical regions, it is so well defined and so accurately known, that even a prescription is furnished by them, for its sure and rapid production, it is as follows :

"Take, of soldiers newly arrived in the West Indies, any number; place them in barracks in a low wet situation, or in the mouth of a gully, over the brink of a dry river, or on the summit of a mountain, and to leeward of a swamp, or of uncleared ground, and where there is no water, or only bad water; give them, each, twenty-two inches of wall in their barrack rooms; let their barracks be built of boards, or lath andplaster, and have neither galleries nor jalousied windows, but close window shutters, and a hole or cellar under the flooring for containing mud or stagnant water, and holes inthe roof for the admission of rain, the windows only fourteen inches from the floor, so that they may be obliged to sleep in the draught of air; let them have drill every morning on wet ground, and when fasting; guard mounting and all kinds of fatigue not in the morning or evening, but during the hottest time of the day; when on sentry, no shade to keep off the direct rays of the sun; bad bread, putrid meat, few vegetables, plenty of new rum, especially in the morning; discipline enforced by terror and punishment, not by reward and promotion: an hospital similar to the barrack room, without offices, always crowded, plentifully supplied with rum, scantily with water; a firm belief in the doctrine of contagion, and a horror of approaching any person affected with yellow fever. Let these directions be attended to in Trinidad, or even in Barbadoes, [and he might have added New Orleans,] and especially when the air is stagnant, or charged with noxious vapors, subsequently to long droughts, the soldiers will soon die, some of them with yellow fever, some of them with black vomit, and those first in the rooms where these directions have been *most faithfully observed.*"

Prescription to produce yellow fever!

This recipe is eminently applicable to New Orleans, and will ever produce the results, as long as it is so "*faithfully followed*"

Great value of the spontaneous cases.

Settles the subject.

the *spontaneous cases*, where nothing of this kind *was possible*, where the only agents known to be present, were a combination of filth or decomposable materials, or disturbance of soil, (their equivalents,) with the meteorological conditions; an epidemic atmosphere! It is precisely here, then, where it was impossible to arise from any other source. The cases presented by Dr. Benedict, of this city, as occurring in a secluded spot in the interior of the country, about a mile and a quarter back of *Hollywood*, are exactly of this character. This intelligent and observing physician, with no theories to support, but with a fine talent for scrutinizing observation, here accidentally pitches upon no less than seven unequivocally *spontaneous cases*, and after the most diligent inquiry, finds that it was *impossible* they could have arisen from any imported or extraneous source; and here he discovers every condition that he afterwards learned that I deemed important for the spontaneous occurrence of epidemic yellow fever, viz: disturbance of soil, unusual humidity, (great rains and heavy destructive mildew,) elevated temperature, great radiation, (that is, great and distressing difference between temperatures of sun and shade,) and cold nights, ultimately*. These are valuable proofs of my position, conclusive to science, and valuable to humanity.

At Hollywood.

Hardly less valuable and corroborative, were the cases occurring at *Gainesville*. Here the cases were clearly *spontaneous*, without any possible origin, (either personal or through goods,) but from the soil, as mentioned in another page, high temperature, intense radiation, epidemic atmosphere, fruit rotting extensively and prematurely, native cows dying without obvious cause.†

At Gainesville.

Do. in Washington.

Dr. Kittridge, the respectable member of the Legislature from *Washington*, states to me, unequivocally, that when the yellow fever first occurred on his plantation, there was not another case of it within fifty miles, and that it arose soon after his extensive yard was spread entirely over (in order to raise and level it,) with fresh earth from the neighborhood. (This was mentioned in a preceding page, for another purpose.)

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* See his interesting paper. † See Mr. Fulsom's report.

At Lake Providence.

The case of Mrs. Selby, the wife of Judge Selby, of *Lake Providence*, breaking out in a remote part of the town, without possible intercourse with any one.

Trenton.

At Trenton, it originated spontaneously, from the causes mentioned; several families struck with it at the same time, in different parts of the village.

In Franklin.

In the town of *Franklin*, in this State, the disease both spontaneously originated and terminated in it, with no sufficient evidence of its importation, and no local cause assigned for its origin.

Black Warrior.

At Mobile.

The case of the "*Black Warrior*," in *Mobile Bay*, affords another striking instance of its spontaneous occurrence, in an epidemic atmosphere.* The first *Mobile cases* clearly appear to have originated in the neighborhood, where there had been considerable excavations for railroad purposes, and the spreading of it to fill up low lots. (For details I refer to Dr. Levert's valuable paper.)

Selma.

The eruption of the fever at *Selma*, was clearly due to the same cause, and is in precise parallel with the earlier cases at Mobile; excavations—cutting down embankments and spreading the fresh earth on the streets and low lots exposed to the intensity of a scorching midsummer's sun. Dr. Mabry, in his interesting paper, clearly and unquestionably shows that the fever originated from these causes.

Demopolis.

"At *Demopolis*, Ala., same *spontaneous cases occurred*, being insulated and at a distance, and having no intercourse whatever with the case of fever existing;" "nor were the nurses more liable than other people."†

Saluria.

At *Saluria*, Texas, spontaneous cases occurred, without even the suspicion of communicated infection. ‡

Port Gibson.

At *Port Gibson*, the same thing occurred, where no possible communication with the sick could have occurred. §

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* Dr Benedict. † Drs. Ruffin and Ashe. ‡ J. H. Brown. § Dr. Wharton.

Baton Rouge.

"At *Baton Rouge*, a number of cases occurred without intercourse, or suspicion of it, with other cases, on the river bank under the bluff." *

Centreville.

At *Centreville*, La., the first case spontaneously occurred in a mulatto, sleeping near an extensive rotting bank of chips, &c. Wind blew steadily over this bank on the village, and the disease progressed. †

Natchitoches.

At *Natchitoches*, the two first cases evidently spontaneous. ‡

Washington.

At *Washington*, La., the three first cases had not been exposed to yellow fever. §

Martinique.

In *Martinique*, W. I., "yellow fever always developed spontaneously." ‖

Bermuda.

In *Bermuda*, the spontaneous occurrence from local causes was equally satisfactory: an old hulk, that was very offensive. ¶

Barbadoes.

From direct information, which the Commission has received from *Barbadoes*, the first case clearly originated in a native, having a pretty stagnant gutter at his door, from decomposed animal matter from a slaughter-house and a piggery in his yard; he died of black vomit." In fifteen days the disease broke out near a crowded church yard in a low situation—here four died in one house—it was confined to this locality for some time, but finally spread over the island." The majority attacked were natives. **

Rio Janeiro.

At *Rio Janeiro*, the yellow fever "broke out in a particularly offensive spot—low, crowded, ill ventilated lodging houses;" abundant sources for it in low, flat grounds, in filthy, ill drained streets, frequently turned up to dry, the neglected receptacles of all kinds of impurities, *in conjunction with atmospheric changes*."

Local spontaneous origin from filth, &c.

"The city is situated on a bay, nearly land-locked, with little tide—sandy and occasionally clayey soil, night soil thrown every night into the bay, and becomes very offensive from the flux and reflux of the tide." The first cases were clearly of *spontaneous and local* origin—the first, in one of the above described boarding-houses, a Danish sailor, direct from Finland, and the second belonging to a vessel that had come from Bahia, which at the time was healthy, and no others of the crew fell sick, and the next ten or fifteen cases were all from this filthy neighborhood."*

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* Geo. A. Pike and Judge Carrigan. † Dr W. B. Wood. ‡ Dr. Crocheron. § Dr. T. A. Cooke. ‖ From a communication from Dr. Amic, Doctor-in-Chief, to the Sanitary Commission. ¶ From printed testimony from Bermuda. ** Dr. Sinclair

Spontaneous occurrence at sea.

Do. on arrival in port.

But there are other evidences of its spontaneous origin here, no less satisfactory. "Several masters of vessels, without being questioned, declared that they entered the harbor with the fever on board, although coming direct from Europe; that as soon as they approached the coast and came within the influence of the breezes from shore, their men fell sick with fever."† And several vessels are mentioned whose crews took the disease soon after arriving in port, without intercourse with the shore.

"Many persons in the country around Rio, caught the fever, though they had no communication, direct or indirect, with the sick,‡ being evidently—as in the case of the shipping—within the influence of the epidemic atmosphere. While those farthest off were not so influenced, and the disease carried among them, did not extend."

Change of type appear from change of climate.

"It is a curious circumstance, and may perhaps tend to elucidate the origin of yellow fever in Brazil, without having recourse to a specific source of infection; that for the few years previous the fevers of the country, evidently not infectious, but of high temperature or marsh origin, have clearly been changing their characters. The genuine remittent has been but little seen for the last three years. In 1847, '48, and '49, it was replaced by a fever of its own class, popularly known by the name of polka, but, in reality, a remittent, and during the present year (1850) it has been replaced by the yellow fever—a disease, also with similar features.§

Opinions of Inspectors General of Hospitals.

Nearly every one of the Inspectors General of Hospitals, of England, in the West Indies, admit yellow fever to be of *local origin;* and Dr. Rush most feelingly and eloquently recounts and laments the different opinion, he, at an early period entertained of its contagiousness, and died firm in the conviction of its domestic origin.

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* Dr. Pennell. † Dr. Pennell. ‡ Ditto. § Do., and report to Sanitary Commission, by Dr. Pennell, through U. S. Consul, R.G. Scott, Esq)

The spontaneous occurrence of this disease in ships from Northern climates, as soon as they have reached a tropical latitude, having foul holds, are numerous and entirely reliable. Holds of ships are worse than cellars, (proverbially unhealthy as these are, when damp and filthy,) for they have the deleterious addition of bilge water, in slight motion, with refuse of every kind, concentrated in an elevated temperature of stagnant air, my colleague, Dr. Axson, shows it to have occurred in the ships; illustrates the same fact: that this fever pursues or breaks out in such ships at sea, and in port, that it is often confined to them, and that it is only finally gotten rid of by the most thorough cleansing. The ample records furnished by Dr. La Roche, in his interesting article on yellow fever, in the April No. for 1853, of the Amer. Med. Journal, and in the second Report on quarantine and yellow fever, presented to the British Parliament, in 1852, furnish the amplest attestation of the *local origin and local cause*; they all concur to prove, without the shadow of a dissent (both the land and sea causes) that filth and fresh earth, (the principle evolved being probably the same,) with atmospheric conditions, has produced, and by sequitun, will produce yellow fever—that *it originates it*, *and that the cause, of yellow fever is known.* And I know of no rule of philosophy where we have produced an effect and with a sufficient cause for it, that compels us to look beyond it. This is most happily in strict accordance with the principles that run through the whole system of causation in other diseases—(and why should yellow fever be an exception?) the stronger the cause, the stronger the effect, under the same circumstances. That a fever of the highest grade of malignity known in this hemisphere, should proceed from the greatest concentration of influences known to be injurious to our race, that in a minor degree produces the prevalence of diseases of the same class, of a lesser grade, has been shown in a preceding page. As yellow fever is at the head of its class in the Western Hemisphere, so plague *arising under analogous conditions*, is at the head of its class in the Eastern Hemisphere, and as plague for a long series of

In ships at sea from Northern ports.

Cause of yellow fever known.

centuries *has been shown to be under the control of sanitary measures*, (and would be now, but for the *fatalism* of the Turk, that makes no improvement, and is wrapped up in his contented ignorance and *statu quo*,) so, yellow fever can be controled by the same sanitary measures; and this is really the only valuable part of the subject. It lays down the important foundation of *prevention*, it erects there a stately structure, on which should be emblazoned in lasting letters of living light, SANITARY REFORM, and let us look to it, with the same sacred duty we owe to our stricken city, as we do to those monuments that remind us of the birth of our political rights and national independence. And if we cannot prevent it—if an Almighty Providence, in his wisdom, has cursed us *beyond all the other nations of the earth*, and we have no remedy after FULL TRIAL, let us hug our chains, as the condemned, and, like the bigoted Turk, display our philosophy, and bear it!

And is controlable.

The foregoing views so fully corroborate the highly important "conclusions" of the General Board of Health of England—drawn from the most reliable living authority,* and are so fully explained by the principles applicable thereto, contained in these pages, that I cannot avoid inserting them here.

Conclusions of the General Board of Health relative to yellow fever.

Conclusions of General Board of Health of England on yellow fever.

"1. That yellow fever epidemics break out simultaneously in different and distant towns, and in different and distant parts of the same town, often under circumstances in which communication with infected persons is *impossible.*

"2. That yellow fever epidemics are usually preceded by the occurrence of individual or sporadic cases of the disease, which sporadic cases are likewise common in seasons when no epidemic prevails.

"3. That yellow fever epidemics, though occasionally extending over large tracts of country, are more frequently limited as to the space over which they spread, often not involving the

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* Kindly sent me by a member of it—Mr. Chadwick—through our minister in London, Mr. Buchanan.

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whole of a town, and sometimes not even any considerable district of it.

"4. That yellow fever epidemics do not spread from district to district by any rule of gradual progression, but often ravages certain localities, while they spare entirely, or visit very lightly, others in the immediate neighborhood, with which the inhabitants are in constant inter-communication.

"5. That yellow fever epidemics, when they invade a district, do not spread from the houses first infected to the next, and thence to the adjoining, and thus extend as from a centre; but, on the contrary, are often confined to particular houses in a street, to particular houses on one side of a street, to particular rooms in the same house, and often even to particular rooms in the same story.

"6. That in general, when yellow fever breaks out in a family, only one or two individuals are attacked; commonly the attendants on the sick escape; and when several members of a family are successively attacked, or the attendants on the sick suffer, either the epidemic was general in the locality, or the individuals attacked had gone into an infected district.

"7. That when yellow fever is prevalent in a locality, the most rigid seclusion in that locality affords no protection from the disease

"8. That on the other hand, so great is the success attending the removal from an infected locality, and the dispersion of the sick in a healthy district, that by this measure alone the further progress of an epidemic is often arrested at once.

"9. That such dispersion of the sick is followed by no transmission of the disease, not even when the sick are placed in the wards of a hospital among patients laboring under other maladies.

"10. That no one of the preceding facts can be reconciled with any other conclusion than that, whatever may be the exciting cause of yellow fever, it is local and endemic in its origin; and the evidence of this conclusion are therefore cumulative.

"11. That the conditions which influence the localization of yellow fever are known—definite, and to a great extent, removable; and are substantially the same as the localising causes of cholera, and of all other epidemic diseases.

"12. That, as in the case of all other epidemic diseases, in proportion as these localising causes are removed or diminished, yellow fever ceases to appear, or recurs at more distant intervals, and in milder forms.

"13. That consequently the means of protection from yellow fever are not quarantine restrictions and sanitary cordons, but SANITARY WORKS AND OPERATIONS, having for their object the removal and prevention of the several localising conditions, and where such permanent works are impracticable, the temporary removal, as far as may be possible, of the population from the infected localities."

Now skepticism must yield up its doubts, and even sophistry can no longer contest the demonstrated truth. A certain combination of conditions, in certain localities produce in thousands of instances, yellow fever. There are rare exceptions to it, these conditions are known—*they are the same in all.* The effect is the same, and the instances are innumerable—the attestators are intelligent and perfectly reliable. There is no assignable motive why they should testify falsely, and it is all in accordance with the common sense and common experience of mankind. Can any thing, short of mathematical demonstration, make it stronger? Could it properly be attributed to the sole agency of the above means in a *single unequivocal instance,* it would be no longer expedient to look to contagion or importation for additional agency; yet we have unnumbered thousands to prove our position. One cause, which is equal to an effect, is always sufficient to account for it. If another be associated with it, which neither increases nor decreases the effect, I do not know by what rule of logic it can be supposed to be instrumental in the production of it. All other views are subsidiary to this, the *true practical value;*—for, if the public mind is *satisfied that the cause is known, the remedy is palpable enough.* It will be no longer

No room for skepticism.

Demonstration.

Its vast practical value.

a question of dollars and cents, it will no longer be a question of the inconvenience of a part of the citizens leaving the city for a few months; it is vastly more. It is a question of life and death, between the hecatomb of victims offered up to ignorance and neglect, and the enjoyment of health and the comforts of life at home. It is between New Orleans as a mere factorage, for she is nothing more, with this constant liability, and New Orleans in the full exuberance of salubrity, unequaled in her climate, with fine promenades, public gardens and parks, with railroads connecting her on one side with the Atlantic cities and the old world, the cradle of the human race, the favored haunts of science and civilization; on another with the granary of the world, and on the West, on the sun sitting on the golden regions of California. Her name will no longer be a theme for aversion and alarm; she will no longer be the "plague city"—the "sepulchral city." It will then be a pride and boast to hail from New Orleans. Surely this is worth striving for, and we shall prove that all this is within our power, that it only requires us to put our shoulders firmly to the wheel, and that you are bound by every principle to own the impulse which duty prompts, and a sense of self-preservation and a just pride aids us in carrying out. These, then, are the promised fruits of this commission, and should they be realized, no small honor in coming time, will redound to him who originated the plan, and the council which adopted and put it in execution.

The importance of knowing the cause of a disease.

The practical importance of knowing the cause of a disease consists in the *means it directs us to use in the way both of prevention and treatment*, and it is for that reason that we have dwelt so long upon it. It is thus also, in the forcible language of Mr. Chadwick, "getting at the antecedents, and mounting to the sources," we reach too, the origin of orphanage and widowhood, of intemperance, and above all, the fountain of the greatest mass of moral evils; and it is *here* that our remedies become ultimately the most radical, effective and praiseworthy.

Prevention is better than cure. It is infinitely less costly, and more easily accomplished. Ten or twenty thousand dollars, judiciously disbursed, may prevent the occurrence of a fever, or an epidemic, that millions cannot cure or pay for, in the loss of life, character, business, &c. For the sake of convenience, and for the purpose of facilitating investigation, aiding the memory, and grouping those diseases proceeding from congenerous causes, statists have classed them into certain divisions, such as have been presented in our record.* The class zymotic embraces those which, in the main, distinguish one country from another in a sanitary point of view, such as epidemic, endemic, &c., (fevers, intestinal diseases, &c.) where this class is large, as it is in this city, being five times greater than it is in Northern cities, the place is esteemed sickly, and when small, the reverse. This class is in a great measure *under the influence of sanitary regulations*, and called "preventable," because they *can be prevented*, and the attention paid to and the efforts, made in their prevention is also a test of high civilization, and the estimate that people entertain of the value of human health and life. The mortality that is *unpreventable* is, in most countries, a constant quantity. In England it is estimated at between ten and eleven per thousand of the whole mortality.

Prevention better than cure

The great value of knowing the cause of disease (and the fatal consequences of a mistake) so far as to be enabled to prevent them, is so forcibly set forth by that eminent man, John Hunter, (on the diseases of Jamaica,) that I quote them: "In military physic, the great improvements to be made are not so much in the *cure* as in the *prevention* of diseases, which depends altogether on a knowledge of their cause. If diseases arise from the air, contaminated from the foul ground of a camp, or the exhalations of a marsh, it can only be avoided by a change of situation, or by taking care not to come within the sphere of activity of such noxious causes. Let it be supposed for a moment that a mistake should be

Fatal consequences of a mistake.

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* Table F.

made, and that the camp or remittent fever be not considered as proceeding from their proper causes, but believed to depend upon *contagion.* It is evident that complete destruction to all must be the consequence of such an error, and in medical history there is reason to fear more examples than one of this might be produced!" How singularly, and how prophetically has this great man portrayed the condition of things in New Orleans! and how truly he says that "destruction" must ensue from such an "error." If full faith is put in the "importation of the disease" as necessary for its prevalence," and "contagion should mark its footsteps," our city would indeed, be likened to our State emblem! and like the pelican *foster in our bosom the poison that is sucking our vitals,* then may we bid adieu to all *sanitary measures,* and to any hope of our amelioration and advancement!

Disease not essential to dense population.

This entire subject is so vast and so important; the materials are so abundantly developed by the humane investigations of the English Government, and kindly distributed, and much of it is so applicable to our situation, notwithstanding the difference of climate, that the temptation to quote far exceeds the limits allowable to this report. In the report "on the experience in diseases, and comparative rates of mortality," by Mr. Lee, it is abundantly shown by all that has been said of the destructive ravages of fever in small towns, and even in *villages,* in various parts of the country, "that diseases of the class termed preventable, are not inherent in, essential or peculiar to places of dense population." That the remedy is, that "the air is to be purified by *immediate removal before decomposition,* of all organic matter, and other refuse capable of producing malaria, and town visitation will be as little required, irrespective of forms of streets, courts, &c., and the density of buildings," and his deductions are that he can find no valid reason why towns *should be more unhealthy than the most salubrious spot in the country!*" That "one-half of all the existing disease and mortality is in excess, and preventable!" That "excessive mortality ought to be prevented by *means compulsory* on all parties, without exception. And he comes to the conclusion that all the causes point to *localised filth, accompanied with moisture*, as the great cause of disease and death" in that latitude. Had those conditions existed here, with our high temperature, *yellow fever* would have been the certain result. He goes on farther to state, as a conviction from his inquiries, that the great mass of the people lose nearly half the natural period of their lives by such exposures; and he came to the conclusion, after examining a large number of towns, that "the *inevitable* mortality of the kingdom is not greater than ten to one thousand per annum, while in some it rises as high as sixty-nine or more. And the remarkable fact was elicited from the inquiry, that let the district be ever so unhealthy, or ever so salubrious, the *inevitable mortality is nearly a constant quantity.* He goes on farther to say that typhus, the great preëminent scourge of the country, is essentially independent of, and unconnected with geopraphical position, climate, physical contour, geological strata, or other uncontrolable circumstances. That there is no *intrinsic* connection between density of population and a high rate of mortality, and the avocations of the people: that where neither surplus water nor organic filth is removed by drainage, there the greatest destruction takes place, without reference to any other consideration, and that the ratio of mortality is directly proportional to the badness of the drainage."

Localised filth the cause of all disease.

Typhus independent of climate.

All depends upon removing filth and moisture.

He farther states, in his conclusions, that, "although the poor are the chief sufferers, yet no class of society escapes the pecuniary consequences of preventable disease—that the use of narcotics and habits of drunkenness, are, in numerous instances, developed and increased by defective sanitary arrangements, and that, in twenty-nine places visited, the pecuniary loss on *one years' excessive sickness*, funerals, and lost labor, is about *equal to the first cost of complete works* for water supply and drainage in the same places." And that THE MOST PERFECT SANITARY ARRANGEMENTS ARE THE LARGEST PECUNIARY ECONOMY, and the cost of *preventable dis-*

The rich suffer as well as the poor.

The cost of preventable diseases equal to the whole public income *cases is equal to the whole public revenue of the country!* He concludes his most valuable paper with a number of suggestions, from which the following will fulfill our present purpose, viz: "*that a penalty should be exacted* on all places where —upon an average of seven years—

1st. The mortality has been greater than 20 to a 1000 of the inhabitants; or

When penalty on the public authorities to be exacted.

3d. Where the proportions of deaths from epidemic, endemic, or contagious diseases has been equal to 1 in 400; or

4th. Where the average of all who have died has not exceeded thirty-five years." How eminently applicable these remarks are to us!

Proportion of preventable mortality.

The amount of "preventable mortality" is more than half of the whole mortality. Last year it was more than five times that amount here. In every epidemic year it is largely increased, of course, and this has been shown to be *pari passu* with the increase of the causes assigned—that is, with the preventable causes.

Origin of disease.

Of cholera.

Poverty, filth, intemperance, wretchedness and crime have a similar paternity. Disease originates from them, and, taking the winds of the morning, it spreads itself to the uttermost parts of the earth. Wherever it finds food it localises itself and becomes developed, and hence, under a certain concentration, the inhabitants of the palace, as of the hovel, become its victims. Hence, all the world is interested in sanitary measures—in eradicating the seeds of disease, and thus make a brotherhood of all mankind. Had not a concentrated malignancy, from filth and bad habits, in a congenial atmosphere, on the banks of the Hoagley, have given a rise to epidemic cholera, the human race might have been saved that afflictive scourge. But why limit it to cholera? The same principle may be applied, with equal justice, to yellow fever, plague, leprosy, the venerial disease—nay, *is there one disease* to which man is subject, that is not the result of the rupture of some one or more *of those great hygienic laws* which the Almighty has laid down for our guidance?

A civilized, refined and humane government is known from the care bestowed on the health, and the value set on the lives of its citizens. In a *Republican* government it should be considered a joint-stock concern, and we should put in practical action the first law of our being—self-preservation. Carelessness in such governments—a neglect of this, its *most* important concern, is as unexpected *a priori* (as they are all joint sovereigns, and unfortunately depend *too much* on what is ignorantly supposed an *individual* concern,) as that those who live by the sickness of others, should be almost the only originators of laws and means to *prevent* sickness! Yet such is the fact. The profession of medicine is the true philanthropism.

Evidence of civilization.

Originators of sanitary laws.

In a society of laws and a Representative Government, where the governed give up a part of their rights and property, too, for the proper preservation of the remainder, it is clear that there is no more sacred deposit in the hands of the representatives of these rights than that of our health. My neighbor may commit such a nuisance as may destroy the health or comfort of my family. The law takes away from me the right to interfere. The power is with the body politic, who represents and with whom is deposited my rights, and as rights and duty are correlative, it becomes the duty of society to interfere and abate it. A flagrant case is put to show how clear the *principle* is. The body politic is bound to abate *nuisances*, however small, or is *responsible for the consequences!* If a bridge across a street or highway is defective and a citizen becomes injured in consequence, the corporate body is amenable.

Legal claim of the civil power to protect health.

By the constitution of our country, no one is allowed to injure or take away the life of another, without being compelled to repair the one through his property and means, and suffer for the other the felon's penalty. It has been demonstrated, that the great mass of the mortality of this city has arisen from *preventable causes*; on whom, then, should fall the merited penalty of this neglect? Our late distinguished countryman, Dr. Rush, with a prescience which often

Original opinion of Dr. Rush.

accompanies true genius, said: "To all natural evils, the author of nature has kindly prepared an antidote. Pestilential fevers furnish no exception to this remark. The means of preventing them, are as much under the power of human reason and industry, as the means of preventing the evils of lightning and common fire. I am so satisfied of the truth of this opinion, that I look forward to the time when our courts of law shall punish cities and villages, for *permitting any* of the sources of malignant fevers to exist within their jurisdiction." The General Board of Health of England, with the Earl of Carlisle (better known in this country as Lord Morpeth,) at its head, says: "The British Parliment has legislated on the conclusions submitted, with an accumulation of demonstrable evidence, that the causes of epidemic, endemic, and contagious diseases, are removable; and that the neglect, on the part of the constituted authorities, to remove such causes, as far as they are obviously within their control, is *a punishable offence!* The foundation which the legislature has thus laid for the physical, and consequently for the moral, improvement of the people, is recognized. Half a century ago, it was said by a great physician and philanthropist, that the time would come, when the legislature would punish communities for neglecting the known means of preserving the public health, and that prediction the British Parliment has been the first to realize." That "philanthropist" was our own great countryman, Dr. Benjamin Rush, of Philadelphia.

First Legislative action upon it.

If, then, we have arrived at this important fact, to what cause *yellow fever is to be ascribed*, if we can no longer plead ignorance, as an excuse for inaction, *we have no further excuse for its continuance among us*, and I do seriously think, that it is as much the duty of the civil authorities, to *keep this city free from yellow fever*, as it is to keep it *exempt from any other controlable calamity!* This is bold ground, and I intend it to be such. I have not come to it hastily; but *that* is not the question; *is it the true ground?* Have the reasons I have adduced, from the investigation the subject has undergone in the preceding pages, been sufficient to convince our people that we have been suffering under *controlable evils?*

As much the duty of city authorities to keep off yellow fever as it is to protect life in any other way.

That is to be the *true ground* before the people now. If I am not greatly deceived then, in this much cherished idea, REFORM is the great watchword applicable to our situation, and no stone should be left unturned to remedy the evils of the past, and arrest the downward march of everything.—Leaving, then, the great principles of philanthropy, of benevolence, of intelligence, nay, even of self-preservation, out of the question,—those which usually move great communities to action,—let us appeal to the mere *pecuniary interests* of the public. That alone, is motive sufficient to move most bodies, as low and sordid as it is. With no position on this continent, if on the globe, equal to it as a mart of commerce; where nature, for that purpose, has done everything, and man nothing, (for health exclusively,) we are permitting every village of yesterday to outstrip us in the race of population, of wealth, of public monuments, of social improvement, and intellectual enjoyment; and last, but what is first in importance, HEALTH, we stand positively lowest in the scale. Every little village, wherever situated, enjoys a salubrity that is our due. This is a painful subject; it is one that is humiliating, nor would I have referred to it so often, were it deemed irremediable. It is not so. If once, when our population was forty-three thousand and thirty-one, (in 1827,) our mortality did not exceed 2.22 per cent.! and in many parts of the country it *does not exceed half this now!* If, in former times, this country enjoyed a salubrity almost primeval, has the soil so changed, the climate become so deleterious; has additional population evolved such a poison, or *have we become* so deteriorated by the golden dreams that most persons entertain on first visiting this country, that no efforts were necessary to acquire it, that it only required to stretch out the hand and gather, and that the primal injunction, "by the sweat of your brow shall you earn your bread," is no longer applicable? If such has heretofore been the prevalent opinion, as it should seem it has, the sad events of 1853 are sufficient to disabuse it. That calamitous visitation

Reform the great question now.

Its sacredness.

A shameful and disgraceful neglect; yet may prove a great blessing.

may yet prove a great blessing to the country, if it shall have brought home to our people the sanitary and salutary lesson, that all the facts we have garnered, the principles we have evolved, and all the hygienic laws and practical results which can be so obviously deduced from them, when once fully adapted and rigidly enforced, will insure to New Orleans an exuberance of health, it has never yet attained, and cause her to rival, in salubrity, the healthiest large cities on the globe!

Certain result if sanitary laws established.

SECTION IX.

RECAPITULATION OF CAUSES AND RESULTS.

Meteorological causes—Special terrene causes—Greater care required in fast growing cities—Can't acclimate to filth—Tracing the progress of the disease by digging—Filth, inundations of the coast and throughout the State. SANITARY MAP *of the city—Application of principles—Location of filth and disease, the same, the one resulting from the other, in each ward, with the ratios to population—"fever nests" "and plague spots,"—the mode of spread of the fever.*

Before proceeding to the application of our *remedies*, it may be best, in order to be thoroughly understood, to make a recapitulation of our positions.

The duty of tracing the *outbreak of this fever*—its *origin* and *transmissibility* has, in the division of duties, devolved upon my colleague Dr. Axson, and most ably and graphically has he performed the task; clearly demonstrating, that it was not from foreign importation that it was derived, but, although connected with foul ships from *European* ports, that it was due to domestic birth and growth, whether at the Levee or elsewhere, and that at its *divers origins*, there was no necessary connection the one with another. Now it becomes my duty, under the resolution in *exposing the sanitary condition of the city*," to show what and where those causes were. They have before been referred to in general, wherever it has been attempted to

Not of foreign importation.

demonstrate their applicability—the influence of such causes in similar and in different climates, their direct bearing upon former epidemics, and on their influence in the rural districts, and I now proceed to show their special influence in the production of the late epidemic.

The causes assigned were two-fold, and these formed the constituents of the epidemic—1st, METEOROLOGICAL, and 2d. TERRENE.

Meteorological or climatic causes

To the 1st. belonged A—a long continued range of tropical temperature preceding the outbreak—the average at midday, of the two preceding months of May and June (instead of being a month later) being nearly 83°, and which continued throughout the epidemic. B.—An unusually high hygrometer, which continued and increased, exhibiting an almost saturated atmosphere. C.—Heavy rains. D.—unusually high and distressing radiation. And E.—An unprecedented intensity and continuance of stagnant air. The unusually early establishment of this tropicoid condition, in the elevation of winter temperature, to that of spring, and of spring to that of summer, thus anticipating by more than a month, the usual evils of autumn, with an aggravation of the burthens ordinarily incident to it, with the extraordinary combination of those which preceded them, were the main ATMOSPHERICAL ELEMENTS which composed it. These are stated in detail in the tables and for the three epidemic months—four or five times daily.

Special terrene causes.

Earth exposure.

2d. The TERRENE CONDITION was composed—A.—of the upturning and exposure of the original soil, in the cleaning out the canals Claiborne, Carondelet, Marigney, &c. The immense exposure in making a new basin on Bayou St. John; digging on St. Paul street to Bayou St. John; digging ditches and clearing between Conti and Common streets, making a new levee and ditch on Lake Pontchartrain, the digging and embankments on the Northern, and Jackson street railroads, and extending up within half a mile of Carrollton—approaching the river and extending near twenty miles in the rear of the plantations—in the centre of the city, the exposure of the subsoil for *water* *pipes* in Bourbon street, near the Water Works (where some of *the first cases occurred*) New Levee and Post 84, and other parts, to the extent of about a mile, and for *gas* probably as much, and principally in Apollo and to Nayades and Dryades, in Galvez and Perdido streets, and* repaving Annunciation, Royal and Chartres streets.

B.—Extensive digging and embankments of earth at Algiers, opposite the city—being almost eighteen inches high, and eighteen feet wide, ascending the coast for about twenty miles, running from half mile to a mile from the river, in the immediate rear of the plantations.

C.—The exposure of the naked bank of the river for about six miles, many parts of it made a common receptacle of, and reeking with garbage and filth of all kinds, exposed to the sun and rain, without a single police officer, to prevent its being made a common deposit for these nuisances, or covering or throwing them into the river, besides the fermenting drainage of sugar and molasses hogsheads on the Levee.

Streets.

D.—The filthiness of the streets, privies and back yards, a matter of common observation by the public, and complaint in the newspapers, the gutters often twelve hours after a rain, which had washed them clear, bubbling up with a gas through dirty water.

Unfilled lots.

E.—The large number of unfilled empty lots and unpaved streets, in various parts of the city, and particularly in the Fourth District, which was much the most severely scourged with the fever in proportion to its population—these low lots being a receptacle for, and exposing filth of all kinds and stagnant putrid water.

Open drains.

F.—The large open drains in and near the city, including the large ones in rear of the First and Second Districts, and Gormley's Basin half filled with the refuse of its district.

G.—The nuisances of soap and tallow chandleries and the

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* The extent of the excavations for these purposes in successive years, I have in vain sought for. In 1837, I have been informed the yellow fever was very fatal to those employed.

Manufactories.

large collection of manure near the vacheries of the Fourth District.

Interments.

H.—The interments *within* the city of six cemeteries, the receptacle of 7,063 bodies during last year, to lend their important aid in corrupting the air.

Slaughter-houses, &c.

L.—The numerous *slaughter-houses* in the Fourth District, and the many large *vacheries* and livery stables, with their offensive and polluting exhalations

Damp, crowded and filthy houses.

K.—The crowded, filthy and unventilated dwellings, in low, damp situations, many in half-drained and unpaved lots and courts, with filthy, stagnant water under the floors.

L.—And about sixty thousand of unacclimated population which has been added to the city since the last severe epidemic of 1847, and we have aggregated together materials to produce an epidemic, and the food to support it unprecedented in this country.

Public kept in ignorance.

No man who is acquainted with these circumstances should be at all surprised at the disastrous results which followed; there was no difficulty in predicting it *a priori;* but our great misfortune here is that the people are ignorant and *kept ignorant* of the condition of things. Delusive assurances are constantly dinned into our ears of the "cleanliness and salubrity of the city," which after a while, deceives even the more intelligent, and produces carelessness and quietude of the public mind, when the most ceaseless vigilance is urgently called for, from our position, and *no official Board has existed for years, whose special business it should have been to attend to this important concern!* The large addition to our population is not properly estimated, nor its results, and some explanation is necessary. A population of exotics, unacquainted with the requirements of hot climates, huddled together, in close, damp, unventilated apartments, with filth, poverty and intemperance, furnish materials in every climate for epidemics. In more rigorous regions, of typhus; in the hotter climates of every class of *fevers*, from the mildest to the most malignant. In cities of rapid growth, there is always a tendency to an

In fast growing cities a large proportion of immigrants.

excess of this kind of population, where the people increase faster than the city itself, buildings of an appropriate kind are not found; hence the diligence and the surveillance that is required on the part of the civil authorities to extend that species of guardianship over these materials of its labor as well as of its wealth, and future growth and prosperity, which they are usually ignorant of. The more dense the population, that is, the nearer men and habitations approach each other, the more curtailed the term of life, especially, in a hot climate. Filth accumulates where there are no pavements, as in many parts of our city, where was the greatest mortality last season. The poisonous matter sinks into the soil, a dangerous compost is formed, which, from the closeness of the habitations, ventilation does not and cannot remove. During rainy seasons, (the season of heat and fever,) its tendency is to spread, and when the temperature becomes favorable by elevation, disease results. That this is not always the case when they are apparently favorable to its production, only shows that these require time for their peculiar combination and physiological susceptibility to develop it *although sickness of some kind or other is always present.* The constitution is slowly undermined, and the duration of life materially curtailed. It is then, erroneous to suppose that these rookeries are not injurious to health, because they do not *always* produce *fever and yellow fever.* There is neither necessity nor propriety in denominating this "*want of acclimation.*" The accusation is no less a slander upon the climate than it is upon decency. Filth is offensive to the mass of mankind, instinctively—as injurious to his health and well being. It would be much more so, were it not associated with habits and exposures that tend to harden and invigorate, and thus render the system able to bear what to another, totally unused to it, and more delicately raised, would be early fatal. Man cannot become so acclimated, (or so habituated to it) that it will not affect him; with climatic conditions he can, because God made one, and man the other; it is at war with the elements of his being, it dilapi-

Greatest mortality where no pavements.

Mortality not from want of acclimation.

No acclimation to filth.

dates the very foundation of life. In another page it has been shown that more than sixty per cent. of the *natives of Egypt* at times fall victims to their endemic fever, the plague,*born and brought up in the midst of it,* and in at least two parts of our country, Petersburg and Bristol, no native reached the years of maturity until certain physical conditions, on which they depended, were altered ; and the miserable, squalid and unhealthy condition of the crowded and cellar population of all cities, is ample proof of the fact. That man may become acclimated, that is, accustomed to certain atmospheric elements, such is the elastic power of his constitution, is admitted as a fact of universal experience, and is explicable under physiological laws, but to attribute the mortality that has occurred here to his wanting this attribute, arising from these conditions, leaving other things entirely out of the question, *is a poor and baseless excuse for indolence and carelessness,* and a reflection upon the habits of our people—a stain upon the public authorities, and exhibits an ignorance of the climate and of its influence on man.

To what extent acclimatable.

The test of the salubrity of a city or country is hardly to be estimated by its influence on the native population ; if so, what is esteemed the most healthy region would be misnamed, for there are but few countries that are not favorable to those born there. Hence it is that *we* denominate the coast of Africa, Batavia, Calcutta, &c., the most fatal to human health and life, (in Rio, *New Orleans* is classed among them !) yet, the natives of these countries respectively, do not so denominate them, and in fact, we know that they enjoy great physical health and vigor. But who ever esteemed a place sickly where *he* lived ! it is one of those pardonable weaknesses we can as easily forgive, as account for. Hence then, *the true test of the salubrious condition of a country must be in its friendliness to the stranger—the facility of its being reconciled to the requirements of his constitution,* and not merely to the native—the acclimated—the habituated to all its otherwise noxious impressions, and such is the resiliency of man's constitution,

The true test of the salubrity of a country.

that he can almost become reconciled to anything—*except filth!* —Let me be understood: acclimation literally means, that the constitution can become reconciled to that which forms the climate of a place—that is, its *atmospheric conditions of heat, moisture, &c.* This has nothing to do with what I have elsewhere denominated the "terrene" conditions. Habituation to the things around us is often called "acclimation," and can often be procured by a few months' residence, but it is not *acclimation*, it is only a fixation of habits and a reconcilation to the things about us, the rupture of which is the cause of so much diversified sickness to travelers of all kinds, new soldiers, &c.—in fact, to all who break the habitual course of ordinary life, that regular routine which is so conducive to lengthened existence, and which the system has become so reconciled to as to adopt it as one of the laws of its being.

The meaning of acclimation.

The difficulty here, then, is not that of *acclimation properly considered*, for this can be easily acquired, but it is to those noxious causes (filth &c.,) that are injurious every where (and to which there can be no acclimation), the more so, where heat and moisture are superadded to them. The climate of this place, then, is not lethal *per se*, but by those factitious conditions imposed upon it, which we have the power, and it is our sacred duty, to remove. Hence then, away with the nonsense about the difficulty of acclimation, which only tends to blind the ignorant; if we are to have a healthy city, we must have a *really clean one.* It is the first; it is the second; it is—in the paraphrase of Demosthenes—*the last essential requirement.* However it may be, it formed an aggregation of materials, with the meteorological adjuvants, sufficient to produce yellow fever, in any part of the present and former yellow fever regions, if in the East, a *plague;* it far exceeds the prescription to *produce* yellow fever, mentioned in a note at page 371, which in the opinion and experience of eminent men accustomed to investigate yellow fever for a long series of years, was amply sufficient for its origination.

The real need.

The compound origin, then, is a clear and unequivocal one.

and rests on contingencies, which after a most thorough examination, I am fully convinced, the ability, the science and ingenuity of man *can* counteract. The task, too, is not such a gigantic one. It can be accomplished without difficulty, by public wealth (not much), by public spirit, of which we have plenty for purposes not half so valuable, and more by *public determination.* A hundred-fold more of each has been wasted upon objects, not a thousandth part of the worth of this—nay, whose value sinks into insignificance in comparison. Can any thing be too expensive? Can any object be nobler? Can any earthly blessing compare in magnitude, to restoring salubrity to a wealthy and populous city, and thus putting her in a condition to fulfil her great destiny, *if it succeeds*! But, in order to succeed, it has to be done *completely*—no half-way measures, no temporary expedients; they are failures to the great public now, will again fill this city with mourning, and are disgraceful to the intelligence, and a stain upon the philanthropy of the South.

All remediable.

Before proceeding to the remedies for the disastrous condition we have taken so much trouble to point out in detail, the result of which it was so easy to predict before hand, let us dwell for a moment, on the immediate and direct effect of these agencies, which have to light us through the investigations of the Commission, to show how demonstrably applicable our positions are.

Tracing the progress of the fever from the city, into the country.

The statement of the amount of disturbances of the original soil, shows that this as *much exceeds that of former years*, as the mortality exceeded that of any other, except from the combined effect of *cholera and yellow fever*, in 1832! That at Algiers it commenced with it, most obviously aggravating, if it did not originate the fever there, (as it did in the city in 1797) causing a large mortality—300 out of 350 hands employed on the railroad, dying of it; that this disturbance extended up the coast, being at a distance from the river from one to one and a half miles; that following up the line of the road, the villages of McDonogh and Gretna successively bore the brunt of its influence; that the unprecedented amount of fevers on plantations, near and in the rear of which these embankments were made, of Mrs. Waggaman's where the sickness was great and the mortality large, of Mr. H. R. W. Hill, where the sickness was unprecedented—nearly every one suffering from it—Mr. Hill himself and another gentleman falling victims to it; that on the Jackson Street Railroad, from the heart of the Fourth District, the mortality was fifty out of the eighty workmen employed, and from the whole of that district probably much greater than from any part of the city; that this effect was added to on the Great Northern Railroad, nearly 50 per cent. of the force employed, having died of it.* That this road extended within half a mile of Carrollton, where the mortality was very great, of this disease, (and I believe, for the first time,) thence some ten or fifteen miles in the rear of the plantations of the Messrs. Kenner and others, where sickness and mortality marked in its track the devastation of this fever; probably the first time the yellow fever was in any of these rural districts on either side of the river. That the probable reason why it was not so destructive in the rear of the Second District of this city in the more immediate neighborhood of the exposure from digging the Carondelet Basin, was that it consisted (with rare exceptions) of an acclimated population, who almost alone were exposed to it, although the sickness with them was very great.

Effect of inundations.

Why rural districts in other States do not suffer so much.

Why fever late in some places.

That the tracing this fever throughout the Southwest, (so far as we have been able to extend our investigations,) there have been similar disturbances of the soil, or other adequate causes of localization; that the *extensive inundations*, to which various parts of the State has been subject for divers years back, has been one of the principal causes of greater infliction on and near our great streams, than in States not thus subject, and consequently, this is the cause *why they have not thus suffered in their rural districts;* that these devastations did not occur at once, but just in proportion, (as seen by the Report from Prof. Blodgett) and as soon as the other condition (the other "blade of the shears"—always essential) was present or matured, viz: the occurrence of a sufficient amount of moisture.

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* The actual mortality here could not be procured—the sick were usually sent to the city, when taken.

In the resumé of our facts, principles and deductions, for the purpose of making the subject more clear, satisfactory and conclusive, I present the—

SANITARY MAP OF THE CITY.

Let us illustrate our principles still more closely, and apply them to the actual condition or our city during the last year, by inviting an examination of the Sanitary Map we have prepared after so much labor*, presenting the *localization of all the cases of yellow fever of the year, in the separate Wards*, together with the main causes which produced them, delineated on the Map, thus furnishing the *argumentum ad hominem*, or practical test of the truth of our principles.

We sat out with certain propositions in relation to the cause of our epidemic and endemic yellow fevers, and gave the facts and reasonings thereon. We have given the record of the experience of other cities and countries, in strict corroboration of our views. From reasoning a *posteriori*, we have stated in advance, by an *a priori application*, that an epidemic disease of the worst form, must occur as a result of existant conditions.† That prediction was most fully verified. I now proceed to a still more practical application, by exhibiting the Map, having marked on it the locations of the various nuisances, to which, theoretically and practically, we refer as the main cause of the epidemic, (and I use the term in an extensive sense, embracing the principal causes offensive to health,) together with the localization of near 23,000 cases of yellow fever, which I have collected from private and public sources, and the presumptive locations of the balance (about 6,000), making in all a total of 29,120 cases.

Application of reasoning.

I desired to construct a Map exhibiting sanitary districts, formed solely of portions of the city having contiguous similar sanitary liabilities. That would have been rather more exact, provided I could have obtained the amount of population in each, so as to show the *comparative influence.* That I found, after full trial, impossible. I then determined to adopt the division by Wards, such as they were when the United States Census was taken, in 1850, as I would then have a standard for ratios—presuming that to furnish the necessary data, and from which I could compute the increase of population, in the three years that had elapsed since 1850. Accordingly, that was adopted as the only possible plan. After completing the collection of the localizations, as far as it was possible, I then proceeded to apply them. Upon scrutinizing the only returns sent here from Washington, in which there was any division by Wards, I found the population of three Wards in the First District enumerated in one aggregate, and the *slave* population left out altogether; and as a most remarkable and unusual number of cases of yellow fever had occurred with that portion of the population (and it is believed) for the first time, and were included in my localizations, it was absolutely necessary to embrace them. To surmount these difficulties, I had to consult all the census returns of the city and State for the last seven years. These I found so utterly discrepant that I had to calculate at last upon a comparison of each, and various probabilities, and make the best approximate estimate of the total population of each Ward the subject was susceptible of, and accordingly present table R, not as the exact population, but believed to be as near it as it was possible to get.

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* In the construction of this Map, I have received most invaluable aid from Major S. G. Blanchard, of this city. Mr. D'Hemecourt, the Surveyor, and the able Street Commissioner, have also lent me their kind assistance.

† Published Report of the Academy of Sciences, of this city, for the year 1853.

Difficulties in computing the population.

City returns not reliable

Map too small.

Again: in order to avoid making the Map too large, or on so small a scale as to be indistinct, it was necessary to exclude the exhibition of some important agencies, to which great efficiency has been ascribed in the production of the fever, viz: basins and canals that have had their filty detritus exposed to the atmosphere, levee dug and embanked, and the low swamps and open drains of the entire neighborhood.

Total cases of yellow fever.

The number of *cases* of yellow fever occurring in the city during the year are estimated to have amounted to 29,120

Cases from private practice.

At an early period the Sanitary Commission issued a circular, requesting professional gentlemen, and others, to transmit to it a statement of the localities of their yellow fever cases, and all other cases of the zymotic class. A few responded at an early day, in full; most of the others were personally solicited by me. The gentlemen whose names* are mentioned in a note, below, kindly furnished data, which, with those before mentioned, amount to.......................... 7,624

From public sources.

The Howard Association promptly furnished its records, and from it, and several of the members, who attended cases not recorded on their books—what was called "outside cases"—and from the various public institutions, mentioned in another page, was procured the localization of............................ 14,680

From Charity Hospital.

To these is to be added those of the Charity Hospital and some other institutions, which do not record what part of the city the cases come from that they receive, were equally distributed in the different Wards, in the *proportion* these Wards had *already furnished the known cases*—these amount to.................... 3,872

Balance how distributed.

The Sanitary Commission, after a full examination of the list and the localization of the distribution, and of those who had furnished them, that from some portions of the city few physicians had complied with our applications, were of opinion that 2,994, distributed among the four districts, according to these apparent deficiencies, would be a fair equalization. They were accordingly divided among the several Wards of each District, upon the principles just laid down.................. 2,994

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* The following professional gentlemen have kindly responded to my application for the localization of their yellow fever cases, and are entitled to the thanks of the Sanitary Commission therefor, viz: Drs. Benedict, Copes, Henderson, Wood, Poelman, Kovaliski, Axson, Dalton, Rhodes, Davezac, Cantrelle, Seguin, Lemonier, Lindsay, Hart, Stone, Picton, Fenner, Zehender, Cenas, Baldwin, Mather, Sunderland, Batchelder, Smith, Stille, McElvy, Ball, Campbell, Dodson, Adler, Quilling, Bensadon, Wedderstrandt, Kennedy, Jones, Beugnot, Moss, Wetzell, Jaubert, Barbe, Peequet, &c.

The members of the Howard Association have kindly furnished me their Book of Record, and Messrs. Bouillemet, Whithall, Willis, Robertson, Nimmo, Shaw, Conniffe, and various others, have ably supplied me valuable details about localities, "pest houses," the character of the cases in different localities, &c. &c., which, with the aid of my brethren, above, furnish great additional value to the observations and deductions connected with the Sanitary Map.

29,120

Explanation of Table R.

Accordingly, I present table R, which presents in its first column the *Districts and Wards*, separately; the second column furnishes the *estimated population;* the third, the cases occurring in *private practice*, as reported to me, and in such public institutions, in which the localities were noted, amounting to 22,304. These, as being more definite, are calculated separately, and their ratios placed in the fourth column. The fifth contains the estimated *unreported*, and upon the principle stated above; the sixth furnishes the *aggregate* of the whole, and the seventh, the *ratios* these bear to the population in the second. The last column furnishes the estimated proportion, *in population only*, the colored bear to the whites in each District, as they are less susceptible of yellow fever than the latter. I wish I could add the proportions of the already acclimated, in each, also, but that was impossible.

It is to be deeply regretted that it is found necessary to form *estimates*, instead of *calculations from precise data.* As the subject was one of vast importance to the community, extraordinary pains and labor were expended to make the results approximate to truth as near as possible. It is believed to do so, and will be obviously useful for most practical purposes.

Sources of information.

In presenting these important details, in procuring the localizations from my professional brethren, and the philanthropic members of the Howard and other Associations—from examining the *localities* of the various nuisances—the "pest houses" —the unpaved, filthy yards, and low lots and squares—(ponds, in the rainy or sickly season)—basins—canals and open drains, and the filthy materials thrown from them—the exposure of fresh earth—the cemeteries—vacheries, livery stables—slaughter-houses and unpaved streets, to which so much evil has been so properly and so justly attributed—information has been obtained, opinions received and facts gathered, so much in accord-

TABLE K.

COMPARATIVE SALUBRITY OF EACH WARD IN THE CITY.

Localization of *Cases* of epidemic yellow fever, occurring during the year 1853, in the several Districts and *Wards* of the city of New Orleans, (according to their division in 1850,) in ratios proportioned to the population of each.

1	2	3	4	5	6	7	8
DISTRICTS AND WARDS.	Estimated Population of 1853.	Number of Yellow Fever Cases *Reported.*	Ratio per 1.000 of the Population.	Number of cases from Public and Private practice unreported.	Total Number of Cases.	Ratio per 1.000 of population, of the whole.	Estimate of the Proportion of COLORED to the Whole Population in each DISTRICT.
1st District.							
1st Ward,..	7.179	2.567	.357	732	3.299	.459	
2nd do. ..	6.447	1.092	.169	312	1.404	.217	
3rd do. ..	9.453	1.211	.128	346	1.557	.164	
4th do. ..	9.125	1.535	.168	438	1.973	.216	
5th do. ..	8.545	794	.092	226	1.020	.119	
6th do. ..	9.639	910	.094	260	1.170	.121	
7th do. ..	10.307	2.988	.289	852	3.840	.349	
Totals,.......	60.695	11.097	.182	3.166	14.263	.234	13.55 pr. cent.
2nd District.							
1st Ward,..	6.105	365	.059	143	508	.083	
2nd do. ..	4.671	582	.124	228	810	.173	
3rd do. ..	4.089	295	.072	115	410	.100	
4th do. ..	7.389	459	.062	179	638	.086	
5th do. ..	8.561	760	.088	298	1.058	.123	
6th do. ..	13.237	366	.027	143	509	.038	
7th do. ..	5.934	318	.053	126	444	.074	
Totals,.......	49.926	3.114	.062	1.232	4.377	.087	26.17 pr. cent.
3rd District.							
1st Ward,..	12.227	566	.045	193	759	062	
2nd do. ..	5.120	891	.174	305	1.196	.233	
3rd do. ..	7.426	928	.128	317	1.245	.167	
4th do. ..	3.429	024	.007	8	32	.009	
Totals,.......	28.202	2.409	.085	823	3.232	.114	24. pr. cent.
4th District.							
1st Ward,..	3.220	1.407	.436	341	1.748	.542	
2nd do. ..	3.460	1.175	.339	284	1.459	.421	
3rd do. ..	3.347	1.371	.409	332	1.703	.508	
4th do. ..	3.169	1.114	.351	268	1.382	.433	
5th do. ..	2.114	586	.277	370	956	.452	
Totals,.......	15.310	5.653	.369	1.595	7.248	.473	12.05 pr. cent.
Grand Total,..	154.133	22.304	.144	6.816	29.120	.188	

ance and corroboration of the sentiments so fully expressed in other parts of this Report, that it seems to be tautology to repeat them here. Nevertheless, as facts, however, portrayed to the eye and of localities near and around us, known to all, have, usually, a more lasting impression upon the mass than theoretical principles, or statements from abroad, however strong, appropriate and well founded—attention is invited to the delineation of these various sources of disease on the Sanitary Map, and then to the table R, to show the *consequences* of them. So clear and convincing are these facts, when brought to explain each other, that longer skepticism on the subject is set at defiance. Let us, then, scrutinize them under the following circumstances: 1st. If, on examination, it is found that when the various sources (above enumerated) are found, and there, likewise, has prevailed the yellow fever, and almost in *precise proportion to their existence.* 2d. If this fever has prevailed there, not only in numerical proportion to the population, but in *proportionate malignancy.* 3d. If we find that all antecedent experience which has influenced society in the establishment of sanitary measures, is here confirmed and corroborated. 4th. That our city has been suffering a frightful calamity, resulting in great injury to the population, and a ruined reputation, *and from removable causes;* and, finally: 5th. That all, or nearly all our past calamities *could have been prevented!* Surely, there will be no longer any hesitation as to the adoption of the most efficient and speedy measures, not only to correct them and prevent their repetition, but to set *ourselves right in the eyes of our countrymen and the world,* to whose public opinion none are too exalted and none are too low to be independent of, or uninfluenced by, as well for the sake of the direct interest of the city itself. But to the proof—and I shall commence with the upper part of the city:

Propositions.

And results.

THE FOURTH DISTRICT.

This district is estimated to have contained, in 1853, fifteen thousand three hundred and ten inhabitants, without including a large proportion of recent immigrants, the whole of which, for the year, has been estimated, in another place, at about five thousand, divided among the four districts in a very disproportionate degree. These, of course, were first subject to, and earliest felt the epidemic influence, and living mostly in impoverished circumstances, were crowded together in the cheapest and most comfortless dwellings. The number of cases of yellow fever in the entire district, is estimated to have been seven thousand two hundred and forty-eight, of which five thousand six hundred and fifty-three were reported to me by the physicians in attendance, in which also are included those from the Howard Association, and other institutions, and the balance allotted, by the Sanitary Commission, from public institutions and physicians not reporting. Being at the rate of four hundred and fifty-two per thousand of the population; more than double that of any of the other districts.

Population and number of cases in 4th District.

Ratio per 1000

Causes.

Let us see how this can be reasonably accounted for.

1st—Want of pavements.

1st—In this district there are but two pavements. These are of cubic stone blocks, and are very good, as far as they go. One extends across the entire breadth of the district, near the river, and the other one-third lower down and about one-half of the breadth. There are several extensive plank roads, (which are delineated on the map,) but much the largest part of the district is not paved at all, and especially the sickliest portion.

2d—Low lots or ponds.

2d.—This district has a vast number of unfilled squares and lots, below the level of the streets; some of which are even built upon, on piles or bricks, having water almost constantly under the houses, which are of wood, old and rotten, and during the rainy season, (which is the sickly season,) become *ponds*, and often very nauseous ones too, and are at all times the receptacle of filth and impurities, the drainings of the yards. These are also mostly noted on the map.

3d — Three cemeteries.

3d.—Three extensive *cemeteries* exist in the district, in which were buried, last year, near three thousand dead bodies. It was in one of these that the offensive exposure of bodies occurred, so painful to the public.

4th—Earth exposure and Gormley's basin and manufactories.

4th.—Not far from the centre of this district, was the earth exposure, necessary for laying down the Jackson and Lake Pontchartrain Railroad; and within its limits exist one of the most dangerous and disgraceful nuisances in the city, the half filled Gormley Basin and Canal, the common receptacle of the drainage and filth of a large portion of this and the adjoining district, bordered by most offensive tallow and soap manufactories.

5th—Crowding houses.

5th.—Probably almost equal to any of these, are the low, crowded, filthy lodging houses, particularly in Adele, Rousseau, and St. Mary streets.

6th.—And finally, the extensive butcheries and vacheries.

Slaughter houses, &c.

These amply account for any amount of sickness, when united to the remarkable meteorological condition of the year, to the entire satisfaction of any inquirer after truth, and who will apply the best recognized principles of medicine to its explanation.

1st Ward—Causes and proportion.

With special reference to the wards themselves, it may be said that the *First Ward*, which has the largest ratio of insalubrity, that a very large portion of it in Adele, Rousseau, and St. Mary streets, were but a series of low, crowded, and filthy "pest houses," inhabited by the lowest class of people, with scarcely any pavements, and many unfilled lots and stagnant reservoirs of putrid water. The proportion here was five hundred and forty-two per one thousand.

3d do.—and do.

That the next worst ward, *the Third*, contained all the cemeteries, and most of the vacheries; on the lower portion it was bounded by the new Jackson street railroad, (five-eighths of whose laborers fell victims to the epidemic) and the swamp. The proportion here, was five hundred and eight per thousand.

5th do.—and do

That the next worst *ward*, *the Fifth*, contained all the butcheries, and many low empty lots or ponds. The proportion here was four hundred and fifty-two per thousand.

4th—and do.

That the *Fourth Ward*, which is the fourth also in the ratio of cases, more than three-fourths of the cases actually occurred immediately around and in the vicinity of that horrid nuisance, Gormley's Basin and Canal, and the extremely offensive soap and candle factories about them, the rest of the ward being comparatively healthy. The proportion is four hundred and thirty-three per thousand.

2d—and do

The Second Ward has numerous low lots, (or rather ponds,) houses on unfilled lots, small crowded tenements, and few pavements. The proportion here is four hundred and twenty-one per thousand. The boundaries of the ward are shown on the map.

Malignity of the cases in proportion to concentration of the cause.

The character and malignity of the cases in portions of this district eminently illustrate the position, that wherever the causes enumerated existed in excess, the virulent character of the disease was usually proportioned, and that there existed there a concentrated influence, inimical to human health and life, that set at defiance, in a great many instances, all skill in medicine, and all the resources of art and kindness. Two of these have been particularly reported to me, viz: the vicinage of Gormley's Basin, and Adele, St. Mary, and Rousseau streets, near it, in the immediate neighborhood of both of which places, the epidemic had some of its earliest victims. Of the first, an intelligent physician, who had a large and painful experience, reports to us, that he "Here witnessed the disease in its most "malignant and revolting aspect. It was not in individual cases "only, that it thus showed itself, but the type in the district "was uniform; day after day I was reminded most forci-"bly of Boccacio's graphic description of the plague in "Florence; they almost uniformly bid defiance to every "variety of treatment. From the very inception of the dis-"ease, dissolution was stamped upon their countenances, "with a distinctness appalling to behold. Not only this, but "even in the small minority that recovered, their recovery "from the fever was followed by the appearance of furun-"culi from the crown to heel; and in one or two their shat-"tered frames sunk under the drain which followed their "maturation. The condition of this portion of the city was "disgusting and revolting beyond all expression; filth of "every character crowded the streets, gutters, pavements, "and even the houses in many instances.

Remarks and observations of the same tenor have been made to me by various members of the Howard Association in relation to the cases in Adele street, and its neighborhood, where they so nobly devoted their time for the benefit of suffering humanity.

1st District—Population and cases.

The First District, or next in order, is estimated to have contained 60,695 inhabitants—11,097 cases of yellow fever were reported to me by the faculty and members of the Howard Association and public institutions, the balance, or 3,166, was estimated by the Sanitary Commission, upon the grounds already stated, from public institutions, and physicians not reporting—producing an aggregate amount of 14,263, and a ratio to the whole population of 234 to the 1,000.

The difficulty in accounting for the sickness here is no greater than in the district above it. True, it has more pavements, but a very large portion is without them, and they are of the worst kind (or pebble pavement)—but very partially protecting from evaporation or absorption. The sanitary condition of the whole river front of the First and Fourth Districts was doubtless influenced much by the extensive disturbances of the soil on the opposite side of the river, the wind blowing almost every day from that quarter, and also from the foul ships in front of them.

1st Ward—Lynch's Row

Whitney's pickery.

The *First Ward*, bounded by Felicity, Benjamin, Magazine and the river—exhibits the largest ratio of sickness. Here existed the spots of *Lynch's Row*, and a nearly similar one on Tchoupitoulas street, and many other houses in the neighborhood consisting of crowded, filthy tenements, with unpaved yards, privies running over and into the streets, the nests of the lowest and most intemperate population, and so of Whitney's old pickery and of similarly offensive blocks in Pacanier and other streets. These fever fountains have been for years the receptacles and manufactories of pestilence. Whenever an epidemic has visited the city, whether yellow fever, cholera, ship fever, &c., here have been its favorite haunts. "Lynch's Row" is enti-

Blocks in Pacanier and other streets.

tled to the pre-eminence, for, I am credibly informed, that during the epidemic cholera in the winters of 1848–'9, no less than 108 dead bodies was taken from it in a very short time. It is conspicuous for its filthy and crowded condition, with overflowing privies and bad ventilation, as they all are. To which add an extensive river front with the banks the receptacle of filth, the batture embracing ponds, with exposure of soil in relaying Annunciation street, during the summer, and intercourse with filthy ships, and the condition will fulfil any expectation of insalubrity, however exaggerated. The number of cases traced to and allotted to it is 459 per 1,000.

7th Ward.

Nuisances in.

The next worst *Ward is the old Seventh*, formed by the new Canal, Circus and Canal streets, and the swamp. Here we have an extensive disturbance of the soil for laying pipes for five or six squares down Perdido street, from Philippa—the Girod street *Cemetery*, where was buried during the year 638 bodies —the filth from the dredged canal, and the open canals and drains and receptacles of filth from the upper part of the city and swamp in the rear, and the fever nests of *Hoey's and Cole's Rows*, near the Work-House, consisting of small crowded filthy rooms, badly ventilated, with bad supplies of water. This ward is but partially paved, with the same kind of pavement as in the first—the cross streets not at all; in this ward are located two extensive *Hospitals* and the *Gas Works*, occupying several squares, having large open drains and the swamps just in the rear. The number of *cases* of yellow fever in it was 349 per 1,000.

2d Ward.

Causes.

The *Second Ward* having for its limits, Magazine, Felicity and Thalia streets, have scarcely any pavements, the open Melpomene drain extends nearly through its centre, extensive disturbance of the soil occurred for the laying of pipes in Pyrtania, Apollo and Bacchus and Clio streets, and Gormley's Basin and Canal immediately adjoins it. The proportion of sickness was 277 per 1,000.

4th Ward.

Causes.

The next in rank is the *Fourth Ward*, margined by Thalia, Camp to Julia and down Julia to and with the canal. This is characterized by having the open drains of part of the Melpomene, with its refuse of city filth exposed to the atmosphere, the open Triton Walk conduits and the stagnant canal, with the exposures for laying down pipes in Prytania and Camp streets, Apollo and Bacchus streets, extensive exposures of earth for several squares (5 or 6) in Erato street, from Dryades for the same, also at the lower end of Calliope street, for the same and for railroad purposes. The ward is but partially paved and very badly drained in the rear, and very low, and badly supplied with water for the purposes of cleanliness. The proportion 216 per 1,000.

The *Third Ward*, bounded by Benjamin out to Camp and down Camp to Julia, and thence to the river, embraces the crowded thoroughfares and dwellings about the market and in North and South streets; the fever brooding place of 82 *Julia*, better known as *McConant's* or *Mitchell's Yard*, *Leed's Row*, on Melicerte street, the old German Theatre on Magazine street, and about the "triangle" with their crowded, filthy and bad ventilated rookeries, with a large exposure of batture in front, and its filthy bank and wharves—the result here is 164 per 1,000.

3d Ward.

Fever nests.

The *Sixth Ward*, within the limits of St. Charles, Canal, Circus and Julia streets, is well paved (but with pebble stone only) and contains the dangerous nuisance and fever spot of *Kirwan's Row*, in Philippa street, sometimes known as "*Irish Row*," and was the theatre of a large mortality last year from the crowded, filthy and unventilated condition of its rooms—the same objection holds to the confined and crowded buildings around Poydras Market, and the filthy and immoral receptacles in Perdido street, and the "fever nests" produced by the large *livery stables* vitiating the atmosphere of an extensive neighborhood, near the very centre of the ward, and having the refuse of extensive hotels. The proportion is 121 per 1,000.

6th Ward.

Fever nests.

Causes.

And lastly, the *Fifth Ward*, bounded by Julia, St. Charles, Canal and the river: this ward is similarly placed, and being the location of the principal hotels and restaurats, is exposed to their refuse, with their susceptible subjects of recent immigrants and strangers, its bad sanitary condition must be attributed largely to the disturbance of the soil in preparing

5th Ward.

Causes.

to erect the large number of new buildings in front, and in taking up and preparing for new pavements there, and for gas, and water; the extensive batture and filthy river banks and wharves, and the large livery stables in its limits. These last mentioned wards were not visited by the fever until a late period. The proportion here is 119 per 1,000.

2d District. Population and cases. THE SECOND DISTRICT.—This contains an estimated population of 49,926, with 3,145 cases reported to me by private practitioners, and occurring there, known to the Howard Association, with an allotment of the balance to make up 4,377 cases, or 87 per 1,000. The cause of this immense difference is obvious enough, and although the several wards differ in their proportions of these cases, the causes are as manifest as their great difference in amount.

2d Ward. Causes. *Ward No.* 2, bounded by Canal, Rampart, St. Louis and the Swamp, having more than double the amount of the average of the district, or 173 per 1,000 embraces in its limits all the *cemeteries* of the District, (of *four squares*) and in which were buried last year 1,163 bodies, the open and half stagnant Claiborne and Canal street drains, and the filthy conduits in the rear, the receptacle of a large portion of the foul and corrupting materials of the upper part of this portion of the city, and vicinity, and the influence of the swamps and open drains beyond.

5th Ward. Causes. *The Fifth Ward*, immediately North of this to St. Philip street embraces the open canals, Carondelet and Claiborne, the recipient of the filth of the upper portion of the city and not beyond the influence of the large exposure of earth made for this canal and its new basin, and its enlargement. The proportion here is 123 per 1,000.

The most of the balance of the cases in this district occurred in the front portions of the third, fourth and sixth wards, in the vicinity of the markets, and in the disgusting and horrid purlieus of this neighborhood, in the first few blocks of *Main street*, *Philip and Ursuline streets*, *and in Gallatin street*. Language fails in portraying the loathsome exhibition which these *fever manufactories* presented; they can only be paralleled by some of the plague spots in the first and fourth districts. A large portion of them consist of boarding or rather lodging houses, occupied, many of them, by crowds who only sleep there, eating and working out, with no privies, (these being monopolized by the tenants on the ground floor,) the streets and levee opposite are used for this purpose; small rooms are sometimes occupied *by whole families;* some use them for raising fowls and dogs, and as receptacles for vegetables for market, and the refuse of the unsalables of the market, from day to day, with little regard to removing the half decayed relics. No doubt these conditions were greatly aided by disturbing Chartres and Royal streets, for relaying pavements, and Bourbon street, for laying down large water mains. An active and efficient practical member of the Howard Association, who attended in this part of the district in his report to me says that "along every street where *paving or digging* for laying the water pipes was carried on *the disease was remarkably more intense*, and also from actual observation, here and in St. John Baptist, the mortality was greatly in proportion to the rooms or houses being nearer the ground." The filthy state of the river bank opposite, (the river being very low, as it always is during our epidemics,) and particularly that portion devoted to the drainage of sugar and molasses. The balance of that district is comparatively healthy, being well paved, with a large proportion of acclimated population, which aids much in explaining the comparatively inefficient influence of the pestiferous spots pointed out, on the population.

Fever nests in front of the 2d District described.

The reason why yellow fever, &c., not all the year, and why limited to 60 or 90 days.

Is it at all astonishing that pestilence here has its favorite haunts? Is it not more astonishing that it does not exist here, and in such places every year—nay, all the year? Nothing shows clearer to my mind the conviction of the true explanation of the views put forth in a preceding section in relation to the necessity of the existence of *two conditions* for this class of fevers. It surely is a munificent and merciful dispensation of Providence, otherwise, the local population of such tainted spots that I have pointed out would be entirely cut off, and why is it that yellow fever epidemics have a limited duration of from sixty to ninety days, whether it breaks out early or late? the meteorological change always ensues, *with—drawing one of the conditions* on which the pestilence depends!

3d District.

Population and ratios.

THE THIRD DISTRICT contained an estimated population of 28,202, in which 2,409 have been reported to me, and 823 have been allotted to it, (as before explained of the other districts) making 3,232, or 114 to the thousand. This is a large number for that district, and arises mostly from the crowded and filthy condition of localities and houses devoted to purposes such as I have just described about St. Philip and Main streets; these are their rookeries in and about Enghien and Moreau streets, the dirty, rag depository on Ferdinand street, a four story block, the receptacle of every species of outcast filth; cheap lodgings for immigrants, and the poorer and more reckless of the laboring class, requiring always the closest surveillance on the part of the civil authorities to prevent their creating and evolving a poisonous atmosphere that will infect the neighborhood, and in no situation is the paternal kindness and vigilance of municipal government more conspicuously shown, than in correcting and repressing the haunts and manufactories of disease, crime and vice. It is arresting it at the fountain head, it is ascending to its *sources*. The cupidity of landlords who lease, and the sub-lessor, even to the third and fourth classes, who does it under him, the sole object of whom is to derive the largest profit out of the smallest space, and the least trouble, doles out to the poor occupant the least possible space; these, in many instances, are immigrants, who are ignorant of the pregnant fact that crowding here is much more dangerous than it is in cold climates, where they come from; it is also composed of a large portion of our valuable laboring class, who are mostly reckless, and also ignorant of or unable to apply any measures

Consequences on the community.

of personal hygiene; the consequence is the inexorable penalty, in loss of health and life; the neighborhood becomes infected, and the community suffers directly, and indirectly, for the support of hospitals, infirmaries, and orphan asylums, the repression of crime and vice, the extension of disease, and also in the loss of labor, that is one of the main ingredients in its wealth, and in loss of character

Cause of insalubrity.

Most of the cases in this district were from *public practice*—(that is from eleemosynary associations,) showing at once the character of the subjects and the sources of the disease. The balance of the district exhibits a very low milesimal insalubrity. The disturbances of the soil, in digging for laying down pipes, and the cleansing out drains, and exposing their detritus to the summer's sun, and the filthy bank of the river in the neighborhood, being the common deposit of filth, here existing the greatest insalubrity, (this nuisance has been a common cause of complaint for years,) together with the polluting air of a cemetery, in which was buried during the year 2,446 bodies, aided much in adding to the number and force of the epidemic here. The map shows the location of these, and reference to Table R will exhibit the state of each of the wards, here and throughout the city.

The number of acclimated population diminishes the ratios.

In the allotment and distribution made of the cases to the several wards and districts, it will be seen that there is a vast difference in numerical ratios. It is to be borne in mind, however, that there is a great difference in the relative number of the acclimated in each of the districts, being greater in the respective districts in the inverse ratio of the number of cases, but, most manifestly, in insufficient amount at all to diminish the force and nature of the conclusion come to, that the cases occurred in precise proportion to filthiness and crowding, and the other conditions named of the several localities specified, and some of these in the Second and Third Districts, would nearly vie with some of the worst in the districts above, and had the proportion of unacclimated subjects been greater, the number of cases would more nearly have equalled some of the worst fever nests and plague spots up town.

Algiers.

Population, ratio and cause.

The condition of the population on the opposite side of th river, is not embraced, directly, in our investigations, and hence it has not received that attention we have devoted to this, and our information is less definite and special. The white population is estimated to have been about 3000, and there was probably fully half that number of cases of fever. This was, no doubt, mainly caused by the large disturbance and exposure of the soil for the railroad and levee.

Origin of the fever.

How the fever spreads from locality to locality.

Difference in Northern cities, and cause.

It is well known that the disease commenced at its various headquarters—pest houses and infected localities, and the filthy shipping mostly from Northern and European ports, about the same time; that it continued in most of them throughout the season, that in a very few (probably but one) it attacked the most susceptible subjects only, and then abated for the nonce; that it always seizes the most susceptible first; that this is usually in the filthiest, worst drained and paved, and worst ventilated and most crowded portions of the city; that here it seems to gather force and strength, and extend to neighboring portions, that this was specially verified with us, and that to show the nature of pavements alone, it was at least a month and even more after the epidemic broke out, before it reached the paved portions of the city, and those grades and classes of society that paid more respect to their hygiene—personal and domestic—that so influential are these in their protective capacities, that some susceptible families and subjects, living almost in the midst of the infected districts, escaped, almost entirely, by proper attention to them; that, finally, the whole city atmosphere seemed more or less tainted with the influence and extension of the poison, as the *materies morbi* became more matured and the resisting power overcome, as if the multiplication of decay, disease and death consumed the ozone or purifying element in the atmosphere. It thus seemed to form an electric chain—the links successively feeling the influence until the whole becomes affected and surcharged. Northern cities are differently situated from ours in their variations of elevation, and of course, in their atmospherical relations, an epidemic yellow fellow has *consequently never prevailed throughout their entire extent.* So true is it, that the conditions we have taken so much pains to point out, find illustrations and applicability every where.

No resisting plain facts.

There is no arguing against facts,—the most unprejudiced—the most unequivocal testimony is furnished by intelligent men who have no theory to support, in the fullest corroboration of the practical views set forth in this report. And it requires nothing but a visit and familiarity with these haunts of disease and festering sores to convince the most skeptical that filth (crowding is the same thing—for it speedily generates it) high temperature and humidity produces yellow fever,—and yellow fever of the worst form,—that its type usually depends upon the concentration of the productive causes, with individual exceptions, with strong resisting power—the *exceptio probat regulam,*—that from these *foci*, it emanates as by radiation and expansion—dependant somewhat upon the direction of the wind, and thus contaminates the entire community (where the conditions can be assimilated.) These facts are conclusively shown by the manner in which the disease originating in these centres—spread during the last summer. And it is well known that where yellow fever is not the result (as this is confined to a certain class of subjects) nearly all other diseases are aggravated by it, by lessenning the tone and vigor and resisting power of the individual. ALL then are interested even to the extent of the health and lives of their families, in the earliest adoption and strictest application of sanitary measures—and to be coerced with the whole force and funds of the body politic.

Why all interested.

The occurrences around us more apt to be impressive.

With all our labor, and it has not been small—we have proved little more than has been proved a thousand times before,—that one of the most efficient agents in the production of yellow fever is filth of all kinds. May it be estimated as a corroboration of antecedent and well established facts and convictions;—may it make a *practical* impression at home, since they have occurred in our midst, and been but the application of the pregnant facts occurring in localities, that cannot be forgotten by those who witnessed them. If there are other opinions,—as would seem, by our having done so little heretofore to prevent these terrible results—they have been gravely rebuked by the occurrences of the year, and must now yield to the demonstration before us, "*opinionem commenta delet dies—natura judicia confirmat.*"

No man can say—or ought to say—that he can dodge—or is uninterested in this question. If he is no longer subject to *yellow fever*, yet vitiated air affects the sanitary condition *of all.* Is there one so insulated that has the effrontery to say, he is not interested in what so deeply affects the welfare and prosperity of society, pecuniary, commercial, social, moral, religious? if so, society should arise in its might and banish the wretch from among us,—he is no longer fit to participate in the numberless blessings for which we are indebted to the kindness of a merciful Providence.

Proportion of natives and those born elsewhere in New Orleans.

The largest portion of the population of this city, has had their nativities out of the State. The United States census of 1850 informs us, that *but one-third* of the population only claims a *Louisiana* nativity or 38,337,—that 18,136 derive theirs from other portions of the United States, and that 55,541, or nearly half come from foreign countries, leaving out the colored population altogether. The proportions in which they have been affected by the epidemic, is stated in table II. On the "cost of acclimation"—Section III. It is evident that this large immigrant population, forming more than two-thirds of the white population of the city—and constantly augmenting in a still greater ratio, claims the greatest value—in measurably making this city what it is (and what would it have been without them?) and every consideration in a hygienic point of view, for they form the element of its future growth and destiny.

SECTION X.

REMEDIATE OR PREVENTIVE MEANS.

How far man can control temperature, moisture—Influence of wooden houses—Best pavement—How to influence winds—Whence their bad qualities. How and when streets to be *cleaned—Custom elsewhere—Empty lots as a source of disease—Other causes, Gormley's Basin. Streams of running water in the streets. Difficulty as to privies—The great one—How remedied—Value of drainage—No farther burial in cities—Best water, what—City water and city air the same—Plenty of water required for health. Surveillance in erection of houses—Certain buildings forbidden in cities for a two-fold reason—Influence of social habits on yellow fever.*

In the practical application of these important measures, the only value of the preceding investigations—we propose treating them in the same order we have heretofore embraced.

HEAT AND RADIATION (i. e. direct and indirect.)

Man's influence on temperature.

To say that man has no influence on meteorological conditions, is to degrade him to the level of the lower animals. Man is, probably, the only animal that understands how to arrange temperature to suit him and apply it to his diversified wants, and has been defined by some naturalists "a cooking animal." Temperature when too great is controled by domestic covering of various kinds, by large rooms with lofty ceilings and by occlusion. St. Paul's in London, is said to be 10° cooler than the surrounding buildings (from its vast extent), and so of all large rooms. By excluding reflected temperature and keeping the rooms dark, we can here procure a temperature, seldom exceeding 82° 4'. So great a difference does this make when effectually done, when aided by thick walls to prevent the transmission of heat, that we can in this way approach the average temperature of the latitude. The depression accomplished in this way, at the North, between in door and out door temperature, is so great that some physicians there, have given it as their opinion, that it may be even hazardous to health! Large rooms with the power of perfect occlusion here, would answer many valuable purposes. They would not only be cooler, but supply a body of fresh air, and if opened at proper times only, be drier. No one, rightly informed, dreams of a high temperature being the *sole* cause of yellow fever; otherwise it would prevail over half the habitable globe. That a prevalence for some months of a range from 80° to 88°, is essential to its production has been shown in another place, and is undeniable. With an average temperature *throughout the day* of about 79° during *the five warm months*, every mode by which we could protect ourselves from direct and reflected temperature should be adopted, planting trees in the public squares and broadest streets, furnishing shade and pure air during the day, and absorbing the noxious gases during the night, encouraging the erection of verandas to our houses, erecting an extensive shed on the river bank, where is the greatest exposure of the unacclimated population, and serving for recreation when the business hours and business season is over, during the sickly period of summer, streams of water constantly passing through our streets during the day (not night,) would greatly promote this important and healthful purpose, the more so as the temperature of river water is much below that of the air.

On a larger scale.

The important *practical* question then is answered, that by these means we have much control over temperature. This is done on a large scale, by extending our improving hand into the neighborhood, removing the forest growth, and draining the swamps and cultivating the soil. We not only lessen the amount of moisture thereby, which does so much injury, but exchanging the moist to a dry condition, we increase the perflation thereby, and hence by increasing evaporation (the drying power) and lowering the dew point, we really lower the temperature to our feelings, at least 5° during the warm months now, and it would be greatly increased with the improvement suggested. This has actually been already accomplished here in relation to temperature to a certain extent, by our more extended clearings creating increased ventilation, beyond that enjoyed in 1807–'10, for by comparing Lafon's tables at that period and ours now, there is an average depression of about 3°, while the extremes are less.* The influence of temperature is so great on health that it has been ascertained in London

Actual proof here.

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* See chart to Report to State Medical Society.

from actual observation, that a depression of 10° *in winter* is fatal to 300 additional of its *poor* weekly!

It is perfectly obvious, the nearer we can make a city approach the country of its vicinage, as to heat, moisture, dryness, and cleanliness, and all those conditions which conduce to purity of air, and of course, salubrity, we shall, in the same proportion, improve it. There are few rural districts in the United States much more healthy than those in our neighborhood. The average mortality during a very sickly year, when the United States census was taken, made it amount to about two per cent., which is a convincing fact that the climate is not sickly *per se*, but has become so from superadded conditions. Let this encourage us to renewed exertions and bring it back to what it has been and *ought to be*.

Just how it ought to be.

Moisture, probably the most important meteorological condition that influences the health of man, is the moisture in the atmosphere, I mean that condition which is beyond and measurably independent of rain. This is *measured* alone by the hygrometer, its destructive influence when conjoined with a high temperature is well known and has been dwelt upon in the preceding pages. Rains, in ordinary seasons serve to deplete temporarily, the atmosphere (as shown by the hygrometer,) not so last summer. There was almost constantly a high dew point, indicating a repleted condition, productive of a want of elasticity in the air, a constant sense of great fatigue, easily induced, an exhaustion of nervous energy and a constant demand upon the system for a fresh supply of power to sustain the flagging energies of life; the perspiration became offensive "funky" that no washing could long remove, and may have aided in giving rise to the opinion entertained by many of the faculty, that they "could detect a yellow fever subject by the smell alone."

Moisture.

Most fortunately for us, this most destructive agent can be greatly controlled by a removal of the multiplied causes of its existence in this city and neighborhood, which has been pointed out, as our unfilled lots and squares, (in wet seasons made ponds of) unpaved and half paved streets, (as pebble pavements may

How removed and remedied.

be denominated), and back yards, our partially drained vicinage, open conduits and neighboring swamps. Hence the constant fogs to which we are subject, the dampness of our stores and houses, immeasurably increased by the erection of buildings directly on the damp soil, (the floors thus lasting only three or four years), instead of being at least a foot above it, for the purpose of ventilation. The first stories of all buildings are more damp, and consequently more unhealthy, than those above them—moisture not being an elementary constituent of the atmosphere, but only held in suspension by it. The Italians know this so well, by long experience, that they only occupy the upper apartments for sleeping. We are thus, measurably, above its reach, and the higher the better, especially during the existence of mortal epidemics, and particularly during those hours when we are most susceptible of disease (at night.) That poisonous exhalations that affect our health are limited to the lower strata of the atmosphere, from whence they arise, there is little doubt. Whether it arises from its combination with moisture, it has not been certainly ascertained, although most probable. As a practical proof of these views, it is well known that when in Constantinople, Aleppo, and other cities of the East, Europeans retire to a domestic quarantine, during the existence of the plague, they escape the disease by confining themselves to the upper floors of their houses. In like manner in the lower districts of Maryland, Virginia, the Canadas, and Georgia. Those persons who sleep in the upper stories are, during the autumnal season, most exempt from bilious fever.

Italian custom.

In the East during the plague.

Wooden houses here, besides decaying sooner, are more liable to partake of all the Hygrometric (as well as thermal) properties of the atmosphere, than brick, and hence should be discouraged as more prejudicial to health in this climate. Doctor Rush has said, that in the yellow fever of Philadelphia of 1793, the greatest mortality took place in wooden houses. This certainly accords with experience here and in Savannah. In Northern cities much improvement in salubrity has been ascribed to

Why wooden houses bad

the abandonment of wooden materials in the construction of houses, and in London, an exemption from the plague since the great fire of 1656. The liability of liquid filth to sink into and adhere to wood, will aid much in accounting for its insalubrity, besides the meteorological explanation of its great liability to decadence. It was a noted commendation of an Emperor of old, that he "found Rome built of brick, and left it of marble." I trust it will be the distinction of this generation to substitute brick or stone for wood in all cases in this city.

Experience elsewhere.

A large portion of all this can be remedied by a *perfect pavement*, which, for this climate, should consist of *materials that would neither admit of absorption nor evaporation*, by a *thorough*—not partial—(for then it is much worse) *draining of the entire neighborhood,* and *then* a renewal of the forest growth. Here ventilation comes in to the aid of temperature in the desiccative process. By having the drains covered, by filling up all low lots—if these are done effectively, and the system of draining duly adjusted—it *must be* drier in the city than in the country. But if the roofs of the houses are of shingle, and no pavements, and imperfect drainage, the water that falls settles or sinks mostly in the soil, sapping the foundation of the houses, rendering the floors damp and filling the air with vapor, or remain in the soil until an elevated temperature brings it forth in all its fatal combinations.

Thorough drainage.

Paving necessary

The best protection that exists against most of this, exists in a *pavement* that will neither absorb or retain water or anything else; that is, one that neither permits absorption or sinking into the soil, nor exhalation from it; that, while it is perfectly convenient for all the purposes of communication, either of pleasure or business, at all hours and seasons, rapidly carries off the water that falls upon it, which, to us here, is of almost equal importance. This is nearest fulfilled by one of iron, by cement of different compositions; next, with cubic blocks of stone, united by cement; then, of thick plank, and *lastly*, by round or pebble stone. To these last, the objection is very

What constitutes a perfect pavement.

decisive, as it fulfills but in a very partial degree the primary objects mentioned. It permits both absorption and exhalation, and especially retains, in its numerous interstices, all the filth that falls on it. There is another objection to it, in the difficulty of keeping it clean. It requires ten times more labor than those do which are smooth, and the practice is freely indulged of allowing the dirt so scraped up to remain for hours or days in the streets, to be washed into the gutters by a transient rain, or trampled in by travel, before removal—thus doubling the labor and increasing the danger—while all that the others require *could be exacted* (without much burthen) *from the front proprietors daily.*

The city may be made drier than the country.

If, then, the pavements (in streets and backyards,) are all perfect, the city would be *actually drier* than the country, a most important accomplishment for every purpose. With abundance of water, filth is easily removed *before decomposition*, and we thus, at the same time, obtain *two* important objects, the prevention of moisture and the removal of filth.

Proofs of the value of pavements.

The value of pavements in the prevention of disease, is known in all cities, in every quarter of the globe. It has been eminently illustrated in Philadelphia, Norfolk, Louisville, indeed, in every city on the continent, and beyond it. They are more eminently applicable in a hot climate, with a constant reservoir of moisture beneath, than elsewhere.—It is recorded of Vera Cruz, that so great was their influence that after that city *was paved, there were eight continuous years of exemption* from yellow fever, notwithstanding there was a constant accession of foreign population from abroad and the interior!

The drainage by machines, in the rear of the city, should be so effectual that no water should exist within two or three feet of the surface, and that, no doubt, can easily be done. They have already materially lowered the before invariable level of the water beneath our city and suburbs, and the land has *apparently risen* near a foot in consequence.

It is satisfactory to know, that we can both moderate the amount of rain liable to fall, and the amount of moisture as shown by the hygrometer. An extensive, dense forest growth not only invites moisture, (that is rains,) but retains it. Its removal, in clearing the country, is known by experience, to dry up springs, and actually lessens precipitation. I found by measurement, (with my rain gauge,) about one-third less rain in the vicinity of Vera Cruz and Havana, than Baron Humboldt did more than half a century before, most of the original growth being removed by a reckless clearing. The Spaniard cuts down, he never plants, as seen wherever he has established his foot. Spain is probably the most denuded country in Europe. Both the soil and climate of Cuba have been impaired by this wretched system, the seasons altered and the country impoverished. The same has been effected in that beautiful country, Mexico; the foot of Attila has been planted there, and comparative sterility has followed, and were it not for what Baron Humboldt calls "the force of the climate," in many parts of it, sufficient nutriment could scarcely be raised for the support of its inhabitants; and, as it is, occasional famines desolate the population. Such, also, occasionally occurs in our own states, from our rather reckless clearings; the rain gauge has not been sufficiently long in use to measure the exact differences.

Influence on amount of precipitation.

Clearing the low country then, and thoroughly draining it, dries it, and as it has been shown, greatly tends to improve its sanitary condition, is urgently demanded here.

As stagnation of air is always accompanied with most moisture, the converse is equally true. WINDS disperse it, and powerfully add to the desiccative process; and this is in proportion to the *force* with which they blow, and the quarter whence they come. By reference to the table of the "hygrometry of the winds," in the annexed tables P and Q, the amount that each brings to New Orleans, on an average of a series of years, is shown. That from the Northwest having the least, and that of the Southeast most. By clear-

Influence of winds.

ing the country, not only is the *force* of these winds increased, but probably their frequency. "*Force*" of the winds is explained on the caption of the tables, and from actual experience, it has been ascertained, that the quantity of fluid removed from the system, (or surface exposed,) is found to be nearly three times as much in a "moderate breeze," and upwards of four times as much in "a fresh wind," as in a calm or stagnant state of the atmosphere.

To winds have been attributed various *occult* qualities, with special powers; these we pass over, as below our notice, the accuracy of modern science demands something more definite. There are certain qualities which we know they possess, and they are expressed in the above tables. The much dreaded Chamsin, Simoon, Puna and Harmattan are known now to derive their deadly properties mainly from their possessing the *desiccative property in excess*; whatever else they may contain is more a matter of inference. When, for instance, winds blow over certain marshes, or other places, it is deemed that they derive certain properties, from the effects that follow; and this is found in certain countries as an invariable sequence, as that yellow fever never occurs unless where there is a great accumulation of filth, hence it is inferred, that there is some essential connection between filth in the one case, and certain qualities in the marsh in the other. Our epidemics are always accompanied with the predominance of the East and Northeast winds; these blow over marshes, (our Pontines,) mostly covered with a forest growth, which, although not impossible to drain and clear, are far beyond our present resources. These East and Northeast winds, are those also which predominate in Savannah during their epidemics. "For twelve miles they pass over the margin of the river, absorbing the moisture and the poisonous gases on its margins." They have been remarked from an early period, and are called there the "Samiel of Savannah."

Their properties.

But there are winds that bear deleterious properties, and that usually predominate in our autumnal seasons which are in our power, and it becomes our duty to correct, viz:—the *North wind.* This wind blows over the six or eight miles of swampy ground. between Lake Pontchartrain and the city, conveying to us whatever is injurious from it, and is almost entirely under our control, that is, so far as *these deleterious properties* are *concerned.* With these corrected by perfect desiccation, clearing and planting, (shrubbery, grass, &c.,) we shall then enjoy the *protective qualities of the Lake breeze*, so much needed from that quarter, and which gives to New Orleans what no Southern city has, viz: — protection from the *too great* desiccative properties of this wind at a period of the year, (the autumn,) when a certain amount is required for health.

Our influence on the North wind.

Small revenue devoted to preserving health.

The *removal of filth*, as the cause of impure air in cities, and all its baneful consequences, is, at once, the great difficulty, and the first duty of the municipal authorities of all cities, inasmuch as the lives of the citizens is of more value than anything else. And yet, how incompatible with this very natural feeling are the main expenditures of city councils and what a small fraction of the revenues of cities is devoted to the *Health Department!* When the *true interest* of bodies politic and social are *understood* and appreciated, it will be altered.*

To forbid the turning up fresh earth in hot weather.

As the first great cause of our *epidemics* (the disturbance of the original soil) is certainly the most deleterious, a city ordinance should be passed forbidding it, *to any extent*, during the season of elevated temperature, that is, from May to October, for any purposes whatever; and so of analogous conditions, clearing out and exposing the filth of canals and impurities of all kinds, of half-dried swamps, &c., of the great exposure of filth by deposits on the river bank, and the duration of the exposure of street filth, after it is collected or *spread* upon the streets.

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* In the estimate for the expenditures required for Health in New Orleans for 1852, it was deemed that $10,000 was sufficient!—The *direct expenditures* were more than *seven times* that amount and from foreign sources, hundreds of thousands were obtained, and the city injured to the extent of millions! Not to be benefited by an experience that ought to have been so valuable, but to pass the wave of oblivion over it as of the hundred lessons before; this year's estimate for *the same was also* $10,000, while $15,000 was to be devoted to the requirements of the *law expenses*—showing their relative estimation, out of a revenue of $1,600,000! A fair specimen of our reckless injurious follies!

Back yards fountains of filth.

We next proceed to that source—the fountain head of the contamination of city air—we mean the *back yards*, where all the offals and filth of families is concentrated, including privies. As this requires a different action in the present or contemplated condition, we shall separately consider it, and proceed, first, to recommend a mode to get rid of the former.

Filth removed before decomposition,

Every yard should be paved in *cement* and graded to the street to facilitate the removal of rain and refuse water, and prevent it and filth of all kinds, being absorbed into the soil, and constitute a sore to fester wherever the temperature is sufficiently elevated to invite it, which is the case here, nearly the whole year. In each yard should be a well constructed sink below the hydrant and falling into covered drains which should lead to the street sewer. The entire offal of each family should be thus carefully run off daily *before decomposition* ensues, and this great source of domestic indisposition *prevented* by thorough domestic cleanliness, and this is only to be effectively done by abundance of water, the solid parts to be conveyed *directly* to the dirt-cart, notice of its arrival being given by a small bell—the cart should be a close one.

And before sunrise.

It is our deliberate conviction that all street and yard filth should *in this climate*, be removed before *sunrise*, (at least in the hot season) before the influence of the morning sun has had power to exhale the poison of the compost to the atmostphere, and before drays and carriages or rains have spread it again on the streets, and the dirt-cart should *immediately* follow the scraper, and by *sunrise* every thing be found clean. This night work is done in New York, and although not sufficiently done, *yet it can* be, and *ought to be*, and particularly *here.* In the city of Mexico an excellent custom prevails of enforcing upon tenants the duty of sweeping their half of each street to the centre by *sunrise* every morning, and thence it is removed by the public carts. This could be most reasonably and should be, exacted here on all streets where the corporation has incurred the additional cost and the occupant enjoys the additional privilege, of having square blocks placed before his property. It should be required for seven

Custom elsewhere.

months *daily*, and for the balance of the year *weekly* might suffice. The dirt should be removed to the rear of the city. This, with the water running in the streets (as advised by our colleague Professor Riddell) would effectually answer the important purpose of keeping the portions mentioned clean and pure.

Bank of river kept clean.

No filth must be left on the *banks of the river*, and a special police be detailed when the river is in a falling condition, which is precisely that period of the year when it is most dangerous to the public health, (viz: July, August, and September). See tables C, D, and E.

Low lots filled up.

All lots lower than the crown of the street should be filled up immediately.

Vacheries and manufactories removed to a certain distance.

Livery stables and vacheries, containing over four head of cattle, should be removed beyond any square containing fifty population or ten dwellings; the same of all *slaughter-houses*, *soap, bone and candle manufactories*, or others creating nuisances all chimneys connected with any manufactory or trade injurious to the public health (as defined and interpreted by your Health Department), should be removed summarily, if the offensive material or quality cannot sufficiently be got rid of by the chimney being elevated high enough to consume it, or extending it beyond the atmosphere of our dwellings.

Gormley's basin filled and planted.

Gormley's Basin should have lime spread over it and filled up, and the space planted with trees and shrubs, and the place appropriated to the public as a square for recreation and refreshment; the canal leading from it, together with Melpomene, and all the draining canals, covered, and when cleaned out—which should always be done in the winter season—their dangerous filth immediately removed to a distance, and in bulk, and lime spread on it.

Running water in the streets.

Our project contemplates *running water constantly* through the streets *during the day*, and all the draining canals, and as the temperature is, on an average, at least five degrees colder than the temperature of the air, it would aid much in cooling the atmosphere of the city.

Whenever *stagnant water* is exposed to the sun in moderate temperature, vegetable infusoriæ, of the class algæ, and also fungoid vegetation, appear rapidly.* Many tribes of these vegetable productions appear to die with great rapidity—sometimes in one or two days—and then decompose. Immediately after these, animalcular life appears. Stagnant water is the most favorable to this order of vegetable productions, which, in giving rise to animalcular life, appears to keep pace with the animalized excreta discharged in the house drainage of towns. This insalubrious order of production is indicated by the smell in stagnant or nearly stagnant ornamental waters, such as the stagnant portions of the Serpentine rivers, which have excited so much declamation. Certain degrees of motion in water are unfavorable to the production of *algæ* and other infusorial plants, the tissues of which are destroyed by swift motion, but a large portion of them are found in slow running waters or open canals with little traffic. The same round of life and death also takes place in open and shallow reservoirs, and in open cisterns, where the water is frequently changed.

How efficient

Light required.

Light, however, appears to be necessary to the production of infusorial and fungoid vegetation, and their formation is prevented by such covering as excludes the light and heat of the sun. †

Night soil one of the greatest difficulties.

NIGHT SOIL.—This is one of the greatest nuisances of large cities—probably the greatest—as tending more to the deterioration of the purity of the atmosphere than any other, and is the most difficult to be got rid of, where declivities are not large and water power great. Its large amount—the poisonous qualities of the gases extracted from it constantly, in a high temperature—lie at the foundation of all health and police laws. Its exclusion from the body after the purposes of life have been served, and its removal to such a distance as no longer to contaminate the air he breathes, are almost equally essential to healthy existence. In our position, water is so near the surface of the earth (say from two feet to six inches), dependent upon the amount of rain that has recently fallen, in digging a pit to receive it, water rises, and the surface of the night soil is always near the surface of the earth, offending the olfactories and vitiating the air, situated, as it usually is, in the *least ventilated* part of our premises. It is proposed, then, that privies be built above, or partly above the surface of the ground, in cemented brick work and proper water closets, with the curved tube, rendering it impossible for any gas to escape from them. From near the top of this pit is a tube or pipe, at whose exit is a strainer, to the street drain, admitting only the liquid part. It thus becomes mixed with the water *constantly passing* through the streets, and is at once conveyed away and its impurities destroyed and sunk in the larger body of water with which it is mixed (one part to two hundred parts of *water being found to neutralize all its impurities.*)* Where this is not effected—or in the condition in which the privies are now throughout the city—immediate steps should be taken that every chamber or pit containing night soil should be rendered air-tight, and *connected by a ventilator* (a tube of an inch in diameter will suffice) *to the kitchen chimney;* and as there is almost always a fire there, and consequent upward draft, the gas would either be decomposed by the high temperature or carried so high in the atmosphere as not again to descend. When the pits become full, they should be emptied, and whenever this takes place, deodorizing substances should always be used, and probably the aqueous solution of the chloride of zinc is the best. As some families are disposed to neglect this important duty, to the great annoyance of their neighbors, it is recommended that the *vidangeurs* be licensed here, as elsewhere, under special instructions from the Health Department; † that no privy be emptied but by its cognizance, and that period be recorded in a book kept for that special purpose, stating the street, house, &c., so that it may be known to this Department who neglects that important duty. All should be thoroughly emptied and deodorized in May and June. An inspection of the records will show who is delinquent.

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* Report General Board of Health of England.

† Report General Board of Health of England.

How remedied.

If not water closets, remove gas through the chimneys.

SWAMPS AND DRAINS.—Running water in the streets absorb the vitiated gases, removes the lighter filth, dilutes the worse and

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* By actual experiment. † Without cost.

Effect of running water through the streets.

refreshes the atmosphere. The larger drains should be covered; for reasons stated in a preceding page, thus having all the advantage of underground sewers. A full and perfect drainage is of great importance to the city. To the extent it has already been carried, it will have accomplished much good for our *future*, when it shall have been perfected in the manner stated. It has already materially lowered the line of former invariable level of water. The valuable space gained has been large. It has been found the invariable result of the extension of drainage in other cities that the portions so drained and those paved have greatly improved in health, in proportion to their proper extension, and that drainage alone vastly improves the entire neighborhood.

Swamps to be drained.

The swamps in the neighborhood must be effectively drained, and that hot-bed of pestilence removed, and the distinction is really very small whether one dies of yellow fever or any other disease of the zymotic class—intermittent, bilious fever or bowel complaints. These, and particularly the first, have greatly increased since the last eight years, during which the imperfect system of drainage and clearing has been progressing in the rear. No! The drainage must be *at first*, *thorough and complete*:—the forest-growth may then be removed with safety, when a new under growth shall have sprung up out of the recent marsh, to protect the otherwise exposed soil.

Cemeteries in the city closed.

The inevitable ills resulting from the SIX CEMETERIES mentioned in a preceding section, can only be effectually remedied by forbidding further interments in them, and invite the proprietors for the sake of the living, to select a more appropriate and retired spot, more free from the encroachment of any future crowded habitations. The propriety of selecting a much more remote spot, will be the more apparent, when I mention, that a cemetery once occupied the very centre of the business mart of this great city, near and about the corner of Canal and Camp streets! and another where the present basin of the Canal Carondelet has been dug. Say, what would have been the consequences had *they* been continued? And yet we still have most of the present city cemeteries in comparatively central positions, in close proximity to large mercantile and crowded populations! Surely, our progress of extension is not to be arrested, by the injury liable to be sustained by the vicinage of corruption, or by awe of or regard for their lamented remains!

That the mortality is not greater immediately around them to the natives, (of which we are ignorant) may arise mainly of its consisting of an acclimated population, though *it must be* injurious to all, as materially aiding to impair the purity of the city atmosphere. (That it is highly injurious to the unacclimated—See Sanitary Map.) It is now a common sentiment, almost universally prevalent, that intermural interment, is injurious to health, and should be strictly forbidden by law.

Plenty of water of the best kind.

PURE WATER and an abundance of it, are as essential to health as the air we breathe In this city the capacity for obtaining both is unlimited. The river water from the great length of the stream, has deposited most of the organic particles that shorter streams obtain from the washings of the earth by rains, and when its mineral admixtures are deposited by infiltration, it bears the reputation of being one of the finest waters in the world. Nevertheless, there is a general concurrence, ancient and modern, that water that has fallen in rural districts and percolated through a sandy soil and there collected, is the purest and best adapted to all the purposes of life. Rain water is known to contain an appreciable amount of iodine, and has a marked influence on affections of the urinary organs, on dyspeptic complaints and intestinal diseases. Nothing is more essential to health than pure water. Rain water when collected in the closely built parts of cities, not only collects the filth and soot off the roofs, and atmosphere, but the gaseous impurities .with which the air is impregnated; and it has been demonstrated, that however long the rain has been falling, foreign ingredients will always be found in it. This water should be filtered as it comes from the roof through the gutters into the cistern, by passing through a bed of charcoal, and its power of absorbing atmospheric impurities and a nidus for musquetoes checked by having a float of wood on the surface of the water in the cisterns. If, notwithstanding all these precautions, animalculæ should be found in it, and the liabili-

Water how impaired.

How purified.

ty of being a breeding place for musquetoes, as all stagnant waters are, may be obviated by placing small fish in the cistern. The presence of animalculæ in large numbers, and it is believed that few cisterns are without them, indicates the existence of animal and vegetable matter usually in a state of decomposition, which invariably acts injuriously, if the water containing them, is used largely for the purposes of food, and the effects will be the more immediate and marked when the animalculæ are large and numerous. The German naturalist Ehrenburg, as the result of very extended observation, established the fact that the existence of visible animalculæ, generally indicates the presence of a lower series of invisible animalculæ descending in magnitude to the smallest monad of the most simple structure, so small that there is probably no smaller organized creature on which it can feed, which as is commonly conceived, by arresting organized matter on the very limit of the organic world, and converting it into its own nutriment, it furnishes in its turn, sustenance to higher orders of animalcular life.*

Town water is town air.

The above high authority then states it as an aphorism that those who drink water which has stood for some time exposed in a town, *drink town air*, whilst they who drink water brought direct from an elevated rural district, without such exposure, are *drinking country air!* All this is easily understood, and the water in our hydrants is liable to the same objections, so far as exposure on the water works mound makes it so, although it is not as much so as the cisterns in our back yards, exposed to the contamination of every vitiation there arising, and the more so, if in the thickly built parts of our city.

But water is not only demanded as a necessary of life, for its own purity, but is required for purifying our clothes, houses, yards, streets, and it is utterly impossible to keep anything in a cleanly and healthy state without its abundant supply for all these important purposes. For these reasons, the water works should belong to the city, and every house that is built should *compulsorily* (by city enactment) be supplied with it.

From the peculiarity of our climate and position the sanitary condition is so much influenced by the *structure of our dwellings* that no building should be erected without due surveillance of the authorities. This could not be reasonably objected to, as it is but an extension of that care for the *health* which is exercised for the *lives* of the citizens in causing buildings to be made sufficiently strong, and in the protection of *property*, providing against the combustible nature of materials in the thickly built parts of the city. The controlling the moisture and crowding are the great enemies we have to guard against. These are corrected by ventilation and space. Every floor should be raised *at least* six inches, and the higher the better, above the level of the crown of the street before the door, and have corresponding outlets, front and rear, for ventilation, always open.

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* Report Annual Board of Health.

Surveillance on buildings.

Houses should be so constructed as to enjoy most advantages from ventilation with such opening to Southern quarters as to have, if possible, the advantages of the drying and enlivening powers of the wind and sun in the yard, and when practicable, on streets at right angles from the river, so as to enjoy the refreshing and purifying influence of the currents of water. Of course, all houses cannot embrace *all* these advantages; we mention those which are best, and the principle on which based.

Direction of houses.

Not more than a *certain per centage of ground* should be used for buildings, so as to admit ventilation and light. From the high value of ground in cities men take advantage, consult only their own profit in the erection of buildings, the object being to realize most out of the space, by over crowding them with houses unfit for the residence of human beings, regardless alike of the propagation of disease and the increase of mortality. The safety of the community, (which is the supreme law) requires imperatively that such a selfish disregard of public rights and interests should cease.

Only a certain amount of ground to be built on.

The amount of *pure air* necessary for respiration has been before stated, and in the surveillance of buildings particular notice should be taken of the size of sleeping rooms corresponding to the number of occupants.

How dampness of stores removed.

It is recommended that the dampness of stores and storehouses, as well as dwellings, so common here, be removed by a free use of stoves; for dry goods, and many other articles, it would be invaluable, and aid materially in the ventilation of *all rooms* for *every purpose*, *chimney flues* for draughts should be made in *every room.*

Why certain buildings not to be in thickly built places.

No hospitals, jails, poor-houses, asylums, or buildings liable to be much crowded, should be permitted in the thickly built parts of the city, either to impair the purity of the air, or be injured by its impurity, but removed to the neighborhood, where their inmates can enjoy the advantages of a free ventilation.

I cannot close this part of our subject, of the local causes and remedies for our insalubrity, without referring, as a faithful historian, although most briefly, to the influence of social habits on yellow fever, and especially, during its epidemic prevalence, as it is the result of my now very lengthened experience in it, that no cause is equally influential.

Influence of social habits.

Civilization, which has so much lengthened the catalogue of human ills, is—in this instance—to be debited, either truly or falsely on the balance sheet, with not a few of the moral and physical ills with which society is burthened. Drinking, as a social habit, barely dates back beyond two centuries. In a hot climate its destructive influence has been found cotemporaneous with the habit, acting in a line with all its injurious influences. The triumphs of temperance, and the disastrous effects of over indulgence in this debasing vice, were never more conspicuous and lamentable than during our terrible visitation last summer and fall.

Effect of intemperance.

During the whole course of the sitting of the Sanitary Commission, as a court of inquiry into the causes of the epidemic, and its great mortality, the inquiry was usually made of those we examined, of the influence of social habits, (intemperance,) upon the liability to the disease, and on its results. The answer was almost uniformly, that it not only *increased the liability to attack, but greatly lessened the chances of recovery.* This is most singularly and impressively illustrated, by the record I have received from the "Sons of Temperance," showing that of these about five hundred remained in the city during the epidemic, of which, only SEVEN fell victims to it; the proportion being 1 in 71.42, or 1.40 per cent.; the mortality of the balance of the city, "of those who remained," under similar circumstances, being 1 in 15.43, or 6.48 per cent., or nearly five times as many. A more valuable commentary on the advantages to be derived from temperance here, during the most malignant fever this country has ever experienced, cannot be found in those annals of philanthropy. May its record long exist as a standing monument of its protection against pestilence, and speak, trumpet tongued, as a warning to the South, against its alliance with disease.*

Proportionate mortality.

The explanation of the cause of the value of temperance, is perfectly apparent to the dullest comprehension, for it is a truth that holds good in every climate, that in proportion to the healthy state of the digestive organs, which intemperance always injures, sooner or later, is the constitution enabled to resist the causes of disease, and to pass through it more safely when under its influence. This is eminently illustrated in those two most formidable diseases, yellow fever and cholera, whose throne and citadel are these important organs; and could the per centage be ascertained, of the exact difference in mortality, in cases where these organs were lessened in their power of vital resistance from intemperance, and where they were in their original integrity, it would form a most valuable argument in favor of temperance; especially in a hot climate, where it is so much more injurious than in others, that was ever furnished to the public.

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*In conference with contractors for various species of public works, as canaling, original or cleaning out; digging, or exposure of fresh earth in various ways; the difference in health and capacity for labor, in favor of those abstaining, and those indulging in ardent spirits, furnishes a triumph to the cause of temperance, that should cause its adoption everywhere.

During the existence of the yellow fever in *Vera Cruz*, in 1847, it was announced by me, (as Chief Health Officer,) that any man who went from a debauch into yellow fever DIED, no exception could be found to it: it is believed the announcement had a most salutary effect.

SECTION XI.

Comparison of New Orleans with other cities, and application of the subject—Penalty incurred by man congregating in cities—Highest class of disease in different climates produced by it—Proofs of high civilization—How extensive fires produce sickness—Effect of sanitary measures in Louisville, Norfolk, Wilmington, Charleston, Savannah, Mobile, &c.—Climatural parallel with the Southern cities—Value of the Mississippi River as a scavenger, &c.—The delusive cleanliness of cities on a sandy foundation—Vera Cruz; its mortality, civil and military, under Mexican, contrasted with that under American domination—Triumph of sanitary measures.

Foundation of all sanitary laws.

There is no more convincing argument, or more satisfactory proof of the positions taken, and the principles laid down in this Report, than by reference to what has been done by our sister cities on this continent. The illustrations from abroad, of the value of sanitary regulations, personal and general, are coeval with our race; indeed, ever since man congregated in cities. Disease is the result of the transgression of the natural laws; *these laws must be understood, to be complied with.* The organism of man should act harmoniously with the laws of matter. In a state of nature, and in a congenial atmosphere, this is so. When the luxuries and refinements of life are carried to a high degree, man pays the penalty of his enjoyments, by a subtraction from his original stamina. It is by restoring these, and a removal of the impediments to their free exercise resulting from his congregating in cities, that constitutes the requisition and lays the foundation of all sanitary regulations. Man must forego the advantages flowing from this social aggregation, with its high cultivation of intellect, its advancement in scientific pursuits and the mechanic arts, and the greater refinement of intercourse and manners, and domestic comforts, or correct the inevitable evils of crowding, filth, bad ventilation, and the predominance of vice, or pay the penalty in greater brevity of life, and the multiplication of human infirmities. This penalty is very sure, varying from twenty to forty per cent., or more, between urban and rural districts, that is, between the use and abuse of sanitary laws. This great mortality is usually embraced in that class of maladies, denominated by Dr. Farr (who first introduced the term) zymotic, consisting of the class of diseases of epidemic, endemic, and contagious qualities. These differ in intensity in proportion to the concentration of the cause, varying in grade from the mildest ailment up to a disease of ferocious malignity, differing in type and name according to climate; having for its head in the North the typhus gravior of authors; in the East, the plague; and in the West, the yellow fever, as crowning monarch of the whole, exhibiting the result of the greatest intensity or concentration of causes producing them, respectively. These are not mere speculative opinions, they are the result of years, if not of ages, of experience, corroborated by the product of daily and hourly observation. When duly considered and properly appreciated, it is the wisdom of the present gathering the fruit of knowledge from the lessons of the past. High civilization and a proper estimate put on human life, is known by the enlightened application of these principles. The prosperity of communities, the health and happiness of individuals, and the moral standing of societies, in a great measure, depend upon them.

Penalty of congregating in cities.

It is wisdom from past experience

The best proof of this position is that by the application of sanitary laws—the duration of man's life has been materially increased, and diseases have been greatly lessened in number

Proofs.

and especially in intensity in those countries in proportion to their application. Formerly the plague swept off millions, and returned either annually or every few years, it is estimated that but a few centuries ago, half the human race, then existing, fell its victims within a short period, while now it is limited to the dominions of the Turkish fatalist, who applies not these laws. In the early part of this century yellow fever devastated the Southwestern parts of Europe. It has yielded to the hand of improvement. Investigation in England, has laid bare the causes of typhus and the hand of amelioration is fast lessening its ills. In our own country, the application of these laws has almost entirely driven yellow fever from the North of Charleston, and there it occurs but rarely and greatly lessened in malignity, and the thorough understanding and application of them will drive it to regions where they are entirely neglected.

The effect of the application of sanitary measures in improving the salubrity of a city have been mostly anticipated, in the preceding part of this report, the skepticism existing here, the vital importance of the subject and the ignorance of the fact (the improvement, whenever it has taken place, being attributed to other causes) will excuse our dwelling a little longer on them, in their illustrative application.

The filthy parts of cities alone subject to yellow fever.

It has been before stated that our Northern cities were formerly as subject to yellow fever as New Orleans, and that at least one of them has suffered as much or more from it than this city, without excepting the late extraordinary outbreak, that in each of those cities it was *confined to a locality*, more or less extended—that these were *proverbially the most filthy parts of those cities*, that these cities have special sanitary liabilities varying from difference of elevation and drainage, which we have not, that these portions have *always* been exempt from yellow fever, that they have been healthy since they have extended their pavements and been secured, that they all have constantly a careful police, and that water has extended throughout their limits, and that they have never been without an intelligent and vigilant health department, that to these causes are justly attributed by the intelligent and observing of their own people, the immunity they enjoy from yellow fever, that the late apparent exception in the case of the bark Mandarin, at Philadelphia, last summer, is in entire accordance with what has been stated, for it was well ascertained by me when there, that the first cases of yellow fever did not originate from that vessel, nor did any of her crew take the disease, but it arose from the negligent police of the neighborhood, especially made so by being the outlet of two half emptied sewers, that this disease was confined to very narrow limits, that it was constantly visited by persons from a purer atmosphere without extending the disease, that in this immediate neighborhood, there had been an extensive fire, a few years ago, and the houses had been rebuilt and improved, and that although in contact, as it were, with this "infected neighborhood," but two cases occurred out of 170 known to have taken it. Fires here like those in London and Hamburg, and every where, if followed by better buildings, have had a fine effect on the sanitary condition of the locality. But when they have not been so followed or a summer had intervened, they have become plague spots, from exposing their cellars, privies and filth of all kinds, and their collections to sun and rain, which have been verified from the fires in Charleston, Savannah, Wilmington, being one of the probable, if not main causes of several severe epidemics in those cities, so well is this understood among them, that fevers have been predicted from this cause alone.

In Louisville.

Effect of paving and draining.

These views will be strengthened as we come South. The city of *Louisville* was formerly subject to annual bilious fevers of great intensity, she was in fact, once called the "Graveyard of the West," being subject to bilious fevers, rivaling yellow fever in malignity, and which threatened to depopulate the town. In 1822, it amounted to 4.64 per cent. In some families nineteen out of twenty were sick at the same time; some families were entirely cut off. There was then but one street paved, and at least eight ponds within the town limits. By draining, paving, and a suitable police, it now enjoys a salubrity equal if not superior to any large town in the West.

Norfolk.

Norfolk was once one of the sickliest cities on the sea-board, and frequently subject to yellow fever. By draining, paving, and filling up her low lots, the collecting reservoir of humid filth of all kinds, she has ultimately become entirely salubrious. From a letter from Dr. Upshur, with which I have been favored, I quote freely. He says: "Many years ago, miasmatic fever was a very common disease in Norfolk, during the autumnal months. *No case, however, originated in the paved parts of the town.* Within the last five years a vast amount of paving has been done, and we now have very little intermittent or remittent fever. Indeed, our sanitary condition has improved *pari passu* with the *paving of streets, filling up of lots,* and increased attention to the cleanliness of our streets, and other sanitary regulations; so that from having been the most unhealthy of the Southern parts, our city has of late become a proverb for its healthiness. Our mortality averages only twenty per month, out of a population of sixteen thousand," which is only one and a half per cent. or, fifteen in a thousand, which, if true, exceeds that of any town of its size, either on the sea-board or in the interior, and confessedly wrought from being one of the sickliest by *sanitary regulations.*

Paving and draining.

Wilmington.

Wilmington was once proverbial for her severe bilious fevers, and occasionally, yellow fever. She is situated on the banks of the Cape Fear river, (here fully half a mile wide with extensive marshes and low grounds beyond,) on sandy hills, having an argillaceous base, with a more or less admixture of an alluvial soil; springs issue from these hills, constituting slow, sluggish streams, with various stagnant ponds, receiving the drainage of the town, when it does not sink into the sandy soil of the place, it being thereby concealed from the public eye is probably, as injurious to the public health as if exposed, as in either case it only awaits the meteorological conditions to become actively noxious. In the former case the condition is

Delusion of a sandy soil.

worse, as it is deceptive, leading us blindfold to repose faith in a security that is delusive. This is particularly the case when the clay sub-soil is not distant, as in Mobile, and other towns along our Gulf coast and on the Atlantic, to which the moist filth sinks, not so low, probably, as the line of invariable temperature of the latitude, and never too low to be acted on by a very hot summer.

Effect of drainage and clearing.

Under this condition of things sporadic cases of yellow fever occurred nearly every year, and a bilious fever of a malignant grade; and finally, a severe epidemic yellow fever, in 1821, demanded the urgent attention of the citizens of the place, when the above condition was altered, pools filled up, culverts opened, filth removed, neighborhood cleared, and sanitary measures fully established, and with these have eventuated the re-establishment of excellent health.

In Charleston effect of drainage filling up.

No earth disturbance.

Charleston.—This city lies but a few feet above high water mark of the bay before it, and is partly formed of made ground. This port has usually been found to be particularly unhealthy. It lies on a peninsula, almost surrounded by the rivers Cooper and Ashley, the neck cut up by creeks and ponds, and extensive swamps in the neighborhood. The ponds and creeks have been filled and drained; the low grounds and lots filled up, leveled, and thoroughly drained by underground sewers; a careful avoidance of disturbing the *original soil* of the streets, &c., during certain months, for gas, water, or other purposes; the constant study of her meteorological condition by her intelligent faculty, and the establishment and *enforcement* of sanitary regulations have had the effect of so improving her condition that from being one of the sickliest, she has become one of the healthiest cities in America. I quote from a recent report on the yellow fever of Charleston, by one of her oldest and most repectable physicians, (who has been her Port Physician and Chairman of her Boards of Health for near thirty years*): "In proof I say these plans have been progressively going on, and in proportion has the healthiness of the city been improved, and while the public authorities are gradual, nay, I may say, actively pursuing this plan, I firmly believe it will be the cause of making the city not only one of the healthiest among commercial cities, but may possibly *make us, in a great degree, if not entirely, exempt from yellow fever, and should it occur, lessen its virulence and mortality.* From long experience and observation, I regard it the solemn duty of the public authorities to go on with this plan, regardless of expense, not only for the preservation of health, but for the extension of commercial prosperity." These are valuable practical facts, the result of long years of experience, from high authority, (as most of us know personally,) and uttered in an enlightened city, where such advice will be appreciated.

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*Dr. T. Y Simons.

Savannah.

The city of *Savannah* has been greatly improved by the exchange of the dry-culture for the wet in the extensive rice swamps in her neighborhood, and her mortality has been reduced *to about half* of what it was before.

Clearing and draining.

To the soil of Savannah the same objection is applicable as of Wilmington and others, it is mostly of a porous sandy nature, and all sorts of putrid debris become accumulated and incorporated with it, the offals of city life, and instead of pure sand or earth, which may have originally constituted the surface of the ground, a species of compost is formed and an active fermentation and decomposition is taken on, whenever there is heat and moisture enough to produce it,* this the true cause why she has heretofore been so sickly, although now so much improved.

Why a rainy season not always required for sickness where a sandy soil.

The verity of the explanation that has been given, in relation to the sickliness of sandy soils, is shown in the fact, that it does not always require a *continued* rainy season to evolve or produce the degree of humidity deemed essential for the development of fever. Rains in such a position may have fallen long before. This occurred at the Bay St. Louis during her disastrous epidemic fever of 1820, "the spring season was uncommonly wet and rainy—converting a large portion of this extensive plain into a sort of temporary marsh, with standing water in many places covering considerable areas of land"—"the district is imperfectly drained by bayous, and in many places, during the wet season, the water stands in pools upon the surface until it disappears by absorption and evaporation,"—"the drought then continued thence from June to October."* Experiments with the hygrometer would have settled the point of the presence of moisture or not—that there was an abundance of water a few feet below this loose soil could have been easily enough shown; I have long essayed to procure the hygrometric condition of this neighborhood and of cities similarly situated, in vain. Assertion supplies the place of fact, an apparent condition takes place of the real one, and we have an additional false fact substituted for the truth, another stumbling block to the progress of medical science.

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* Waring.

Parallel of New Orleans with other Southern cities.

In relation to all these Southern cities and towns it would be very instructive, were all the materials at hand to run a parallel between them and New Orleans. Their meteorological conditions have many marks of similarity. Our winter temperature is not so low, our summer temperature not higher: our enhanced hygrometrical condition is more or less in excess, *but it is more under control*, for our swamps are more susceptible of drainage: the precipitation here is somewhat greater, but then it is in our power, in part, to correct this, not only in relation to its amount, but to hasten its discharge in neighboring reservoirs. It cannot become absorbed here and thus retained as it is with them. Underground sewerage and thorough surface drainage then can probably do more for New Orleans that it can for them. ALL THE FILTH that collects in and about New Orleans can be removed by these and other means, for we have only to throw it upon the surface of the *great and unequal scavenger*, which a kind Providence has mercifully offered us and which we so blindly refuse to use, (to the extent we should) to wit: the mighty river before our door, while the above cities have but three or four feet of tide and but a few feet elevation above it, giving

All our filth can be removed.

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* Dr. Merrill.

and *returning* the mixture, but rendered worse by the addition, or to sink into their absorbent soils to return upon them as a concentrated poison, at uncertain periods, when the other requisite—the meteorological condition shall occur.

Attributes of the Mississippi river.

Let us do justice en passant, to our noble river: a wide pervading influence for evil has been attributed to our great benefactor—that resistless stream so pregnant with blessings to us when managed rightly,—be the credit then where it is due. It is well known and admitted that all sluggish streams in hot climates, even those that admit of a moderate tide of two, three or four feet, by uncovering its banks, bars or islands pregnant with organic remains are highly injurious to health. The *Mississippi has none of these attributes*, it is a deep stream (of 100 to 150 feet) throughout its passage in Louisiana,—it is a rapid stream (of from two to five miles per hour) always productive of a salubrious ventilation, and when low, uncovering mainly sand-bars *within its banks*,—it has little or no organic matter in it; and hence its overflows required for the cultivation of rice would not be so injurious as other streams which are different. The offensive materials on its banks opposite the city is derived from the shipping and the city refuse. For these reasons probably fewer rural districts in our country are more salubrious than those situated immediately on its banks with the swamps at a distance covered and protected, so different from the sluggish tide water streams throughout our country, on few of which can the autumnal season be passed in safety.

Cause of the salubrity of the rural districts.

Mobile.

The comparison of *Mobile* with New Orleans in relation to their hygrometrical condition I cannot make, because that of our sister city has not been made by her scientific men; but, excepting her Western quarter, she has as much to increase or to give intensity to that worst condition as New Orleans. Her average annual precipitation is larger by more than *four inches* than ours, (years 1840, '48.)* If her streets are comparatively dry and clean on the surface, it is but to deceive one, a sandy soil with a substratum of clay, not far distant, only conceals that which with

Probable humidity.

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* North—N. O. Journal, 1851.

us can be washed off, and deludes with a semblance of cleanliness without the reality, while the *festering poison only awaits the meteorological condition to lend it wings and give it virulence.* That such is the fact is rendered probable from the circumstances, the explanation given, the rationale and the results, and is fully justified from what we find to be the case in other countries similarly located. I need only refer here, in illustration and corroboration, to the malignant fevers of Walcheren, whose situation is much like it. The fevers of Pensacola, of Bay St. Louis, of Galveston, of Vera Cruz, are thus mainly accounted for, all of which clearly demonstrates, *that there is no substitute for an impermeable pavement in a hot climate.*

Only apparently clean.

Proofs elsewhere.

The distinguished Dr. Fordyce seems also to have been of the same opinion. In his fourth dissertation, he refers to the "insidious and dangerous character of these sandy soils. Perfectly dry and being clear from wood, with water only a foot or two from the surface, so destructive to the British army on a sandy plain in Flanders, and again to a region in Peru where water is every where to be found at about seventeen inches below the surface of the earth, although the country is itself barren for want of water, and uninhabitable from the number of dysenteries and semitertians that take place in it."

In Flanders.

Vera Cruz is another instance in the midst of the yellow fever zone, still more unfavorably situated than any that has been mentioned, and proverbial for its pestilential climate, that I have some scruple in referring to. For several reasons I am urged to do so, however, by my colleagues, as furnishing a great and direct triumph to sanitary measures.

Vera Cruz.

Triumph of sanitary measures.

From the extent and fatality of the *vomito* here and the seizure and occupation of it by the American army, being in the very nick of time for its devastations, it was fondly calculated in Mexico and extensively believed in Europe, that here the American troops would meet a worse enemy in the climate, than in the army of our foe.

The position of Vera Cruz is peculiar, it is situated on the Western shore of the Gulf of Mexico, in latitude 19° 15' North, on a sandy plain, elevated about five feet above the level of the sea, in the rear of the city are sand hills varying in height from twenty to forty feet, and distant from 10 to 1500 yards, between

Description of city and its neighborhood

these and the city during the rainy season are large pools of standing water, extensive marshes extend to the Southwest, covered more or less with mangles and other brush wood, with numerous small lakes or ponds, these empty into the sea along the South wall of the city and are the principal means of furnishing water to the mass of the inhabitants, and is largely influential in the production of the insalubrity of the place and have been complained of for centuries. The city is paved with coral rock obtained from the sea. It is surrounded with a high wall (about fifteen feet) so greatly interrupting ventilation, that as Chief Health Officer of the place in 1847, I strongly advised its being pulled down as it faced the sea, or to windward. The streets were formerly kept very filthy, and the place very badly supplied with water either for domestic use or cleanliness. Such was its condition when taken possession of by the American army under Gen. Scott, in March, 1847.

In order to make the comparison as just as possible, between the *Mexican and American regimê*, the periods under consideration shall be as approximative as possible, that is, immediately succeeding each other; hence, for the Mexican, I take the years 1845–'46 and the two first months of 1847. The civil and military I am fortunately enabled to seperate, and they are both derived from *official sources.* For the American, I commence after but two months of possession, when the greatest mortality incident to the recent conflict, was in some degree abated, although this continued large throughout the season, resulting partly from this cause and partly from the hospitals of the place being made the general hospital of the army invading Mexico, and hence was greatly increased from this cause, and from the large number of camp followers and retainers and others carried there, in part by curiosity, and the period embraced in the comparison comprehends *only the most sickly months* in the year on the part of the Americans. The civil and military mortality are also separate and are all derived from *official sources.*

PER CENT.

Civil mortality, and military during Mexican regime.

The ratio of the mortality of the *Mexican civil* population during the years 1845–'46 was.............. 6.28

The ratio of their *military mortality* for the years 1844–'5–'6 and part of 1847 was ascertained, but the amount of the force was not clear, it is put at somewhat less than it was found in 1847, which is probably one-third too much. The ratio of mortality to the strength assumed, is................................ 13.90

The ratio of total mortality to total cases admitted into their hospitals is............................ 19.49

The ratio of mortality, of the *diseases of the skin*, which were very numerous *were omitted*, would be.... 25.70

The proportion of deaths by *yellow fever* to the whole cases admitted were............................ 85.23

And the proportion dying of yellow fever to the estimated strength was............................ 7.95

Do. of each during American regime.

The total mortality in Vera Cruz, in 1847, during the AMERICAN REGIME, embracing only the *five sickly months* from first May to first October, of the *civil population*, including *strangers and foreigners* of every kind, not officially attached to the army, was (by official returns to me) according to the estimated population, and consisting too, mostly of the most reckless people on the face of the earth, and comparatively few acclimated, to 3.52

The mortality of *the military* during the same period, embracing soldiers, quarter-master's men and all attachés of the army, including those left in the hospital on the departure of the army for the interior (a very large number,) the men sent from that army from time to time, to the general hospital at Vera Cruz, the army consisting mostly of undisciplined soldiers, unaccustomed to the climate, was.................................... 4.46

One-third of this, or 33.18 per cent. consisted of yellow fever.

The mortality of the first infantry, embraced in the above, is entitled to a separate consideration:—it garrisoned the city the whole summer, and is a fair comparison with the mortality among the Mexican soldiery. The aggregate force was 2,047, and the aggregate mortality 74, or.. 3.61

(Inclusive of a proportionate mortality by yellow fever of 14.80 per cent.)

Let us analyze this statement a little more in detail.

It appears then that the average mortality of the *civil population* at Vera Cruz, (during, of course, the *Mexican regimé*) amounted in the years 1845–'6, to........... 6.28

The mortality of the civil population about one-half, and of the military about one-fourth during the American in comparison with the Mexican regime.

While the *same population* under the *American regimê*, in 1847, compared, not of settled citizens acclimated measurably to the soil exclusively, as before; but of these, and incorporated with them all that large class of reckless camp-followers of a victorious army, with all their dissipated habits, amounted to........................ 3.42

And that the mortality among the *Mexican military* at the same place, during the years 1844–'5–'6 and part 1847, amounted to.............................. 13.90

And the mortality to *cases*....................... 25.70

Of which the vomito or yellow fever, constituted of it. 85.23

While among *our military*, including attachés of the army of every grade, the mortality amounted to....... 4.46

While in the First Infantry (military alone) amounted to but.. 3.61

The bare statement of the foregoing valuable facts, is its own best commentary: it is furnished as an instance of *the influence of sanitary measures in a hot climate*, *on unacclimated people*, even under the influence of peculiarly unfavorable circumstances.

After the lengthy recommendations given of sanitary measures in the preceding pages, it would be little more than repetition to say more than that these views were carried out with military precision, and that it consisted in the strictest policeing, rigidly enforced, at the earliest hour, and the strictest temperance advised; tropical fruit, and particularly if unripe, forbidden. The city was divided into districts, and responsible agents and physicians appointed to each, and required to report to the Board, at short intervals, the state of each, together with the number and character of the diseases occurring.

SECTION XII.

Resumé.—We shall now bring this Report to its close with the following RECAPITULATORY PROPOSITIONS AND COROLLARIES.

1st. That the insalubrity of New Orleans, which has now continued for so many years—with some remarkable exceptions—is not natural to her, or *necessarily* incidental to her position; that it is the cause of the high price of everything, and the direct means of retarding her progress to prosperity, and which will continue to exist until effective measures are taken to remove it.

New Orleans not sickly, per se.

2d. That the direct and *inevitable* change of *climate alone*, is not the sole cause of the mortality of immigrants, but the union of the climatic with the terrene conditions under *different circumstances*, were the efficient agents in the destructive influence on each class of people as pointed out according to nativity; that man cannot become acclimated to the second cause, or terrene (filth, &c.) any where, and that the acclimation to our first cause (or atmospheric) would be trifling, if the conditions constituting it, were so modified, as was clearly shown to be, in our power.

Mortality not owing to want of acclimation.

Can't acclimate to filth.

3d. We have endeavored to prove what were the CONSTITUENTS of the epidemic yellow fever of 1853, that they consisted of certain atmospheric and terrene combinations; that these causes, so far as we had the means of ascertaining, were confined to the limits of the fever district; that it began with these causes and ended with them, throughout the limits of the epidemic region, and that when these ceased, so terminated its influence on man.

Epidemic constituents.

4th. That one of these causes, (the atmospheric,) is more or less present here every summer, and that when the second (or terrene) exists in sufficient amount, an *epidemic* is the certain result, so far as near sixty year's experience will go to prove it; that this terrene condition is mainly composed of extensive disturbances, or upturning and exposure of the original soil of the country; that without this there has been no such *epidemic*, although, between the occurrence of some of them, long periods have elapsed; and that its ravages or malignity appears to have been pretty much in proportion to the extent of that disturbance.

The efficient cause of all our epidemics.

5th. That for the existence of an *epidemic*, a wide pervading atmospheric cause being one of the essential elements, an *epidemic disease cannot be imported*, and that as a contagious disease cannot depend upon a *general cause* for its existence, but must derive its qualities from a specific one; epidemic yellow fever is consequently not a contagious disease.

Epidemic not importable or contagious.

6th.—That to constitute an *endemic yellow fever*, the difference of which from an epidemic was fully pointed out, that the *apparent contagion* was only the extension of the epidemic principle, a lesser degree of the same, or what was believed to be equivalent, (filth of all kinds, and decomposing materials) with a lesser degree or intensity of the first or atmospheric constituent, were essential.

Requirements for an endemic.

7th.—That when these causes did not exist in a sufficiently high degree to produce *yellow-fever*, intermittent, remittent bilious, or other periodic fevers were the result, demonstrating by the clearest analogy that they proceeded from the same cause, and that they differed only in degree and intensity, a major amount of the very same materials being required to produce yellow fever, as a minor one does for bilious or periodic fevers.

A lesser am't required for periodic fevers.

8th.—That all these fevers are produced from *local causes*, more or less extensive, and that the fevers, the result of these, were limited to these bounds, that these causes are well understood, and were extensively pointed out in detail, that wherever the epidemic *extended*, there were *causes to localise it*, that where these did not exist, the cases of the epidemic *conveyed there did not extend*, and that consequently, that all these fevers arising from bad air, are no more contagious or infectious the one than the other, the liability to them is limited to the bad or infected air

Local causes and local effects.

and personal susceptibility; and finally, that these are *of the greatest importance in their practical bearing on sanitary measures.* And,

9th.—That the temporary epidemic cholera which occurred here early in December, it was shown, depended also, upon two conditions, an atmospheric and a terrene; that the first of these was different from that required to produce epidemic yellow fever, although the second was believed to be the same.

Cause of epidemic cholera.

From all which the following corollaries were deduced; viz:

1st.—That an *epidemic yellow fever* in New Orleans, if produced by the causes stated in our third proposition, as believed, being known, is *controlable*, that is, PREVENTABLE.

Epidemics controlable.

2d.—That an *endemic* yellow fever, arising from the same or equivalent causes, as above, although in a lesser degree, can also, be mainly, if not entirely controled.

Do. of endemics.

3d.—That the causes of bilious or periodic fevers being known also, to arise from a smaller amount, or more diluted condition of the same circumstances, although more general and extensive, and more dependent on personal hygiene, it is in the power, as it is the duty of the civil authorities to mitigate, if they can not entirely control them; and finally:

Do. of periodic fevers.

4th.—That it was demonstrated, that by the proper application of curative measures, by the establishment of proper sanitary laws and police ordinances, rigidly enforced and effectually carried out, New Orleans can be made as healthy as any city in America; and that it was not only the interest of the city to accomplish these important purposes,—but that—

New Orleans can be made healthy.

5th.—A penalty could be as much *enforced upon the civil authorities for neglecting the removal of conditions subversive of health and life, as for any purpose* for which society was formed.

Claims for legal enforcement.

Proofs and illustrations were furnished of the influence of sanitary regulations in various cities of the old world and on this continent, and what they had accomplished in removing causes of disease and restoring sickly cities to the enjoyment of salubrity.

Her prosperity alone depends upon health.

A comparison was instituted between New Orleans and other American cities, and particularly with Southern cities, with a running commentary on their comparative liabilities and immunities, and the important result was come to, that our city was far from being in an irreclaimable condition, and that she could compare favorably with any of them.

Intelligence synonymous with health.

It has been as truly as beautifully said, that intelligence is not only synonymous with moral power, but with health.* Health manifestly depends upon our observance of certain laws, which the Providence of God has entrusted for our guidance, which are recognized by all mankind and are instinctive. When these laws are broken, punishment (that is, disease,) inevitably follows, sooner or later; but it is in our power, as it is our duty, to comply with them, and exert the faculties He has given us for our welfare. We can only know the future from the past; it is the part of wisdom to know that like causes produce like results, under similar circumstances. The constant recurrence of yellow fever in the epidemic form, whenever there have been large disturbances of the soil, and *never otherwise*, in so long a period as SIXTY YEARS, and in proportion to that exposure, must be something more than a mere coincidence: it seems to the Reporter as well attested as any fact in history or science, as too intelligible to be misunderstood; invaluable as a warning, and the memento on that Chart as plain to us as "the handwriting on the wall" to the prophet of Israel. No less palpable, and as little to be disregarded, are the "plague spots" which have been demonstrated here, as in other cities, that here, in the midst of filth of all kinds, are the true birth places of disease. and it was equally clearly shown how much it was in our power to remove them, and that it was our duty and interest to do so, not merely on account of present prosperity, but even from a higher consideration, the promotion of the

The real cause of our fevers.

All cities improved by sanitary measures except New Orleans.

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*Marx Willis.

great interests of religion. Our reputation abroad for salubrity is ruined, reform is now only left us. All cities, wherever situated, whether in the old world, the highly favored seats of renowned monarchs, covered with marble, drained and watered by works that are still the wonder and admiration of the world, or in the new, the selected marts of far enriching and enterprising commerce, have been subject to epidemics; which, like the monaxysinal diseases, the trials of infantile life, stand as tests of the constitution. Many quail and sink under the trial. New Orleans has stood many such trials; she is now at a crisis, and it will depend upon her people to say whether she shall recuperate or not. Her consulting faculty, (this Commission,) have pronounced her entirely susceptible of cure, *if their advice is followed*, otherwise not. A new era has manifestly sprung up, it is signalized by the appointment of this first Commission of inquiry into the real, not suppositious, condition of New Orleans. We look upon it as a proof that the great reformation so much needed, and without which no permanent prosperity is to be expected for this city, is about to commence; that the influence of sanitary measures is at last to be attempted, and we can not avoid the prediction, that it will eventuate as it has in all other places, in future prosperity and advancement. Nothing else is now wanting to repair the errors of the past, and it does no violence to probability to foretell from them the most brilliant future. If the Sanitary Commission shall not succeed in convincing their fellow-citizens of this, and that the same principles are applicable to our city as to all others, which is the true practical object of their appointment, then that appointment will have been superfluous. But, if we shall have shown by unmistakable facts, figures and argument, that we have nothing peculiar in our climate or position, but what is entirely accessible to amelioration and amendment by the hand of reform; that our city may be restored to salubrity; that her reputation for perennial pestilence shall be

The certain result of proper measures adopted here.

no longer applicable; that upon the broad foundation of SANITARY MEASURES we can erect a monument of public health, and, that if a beacon light is erected on its top, and *kept alive by proper attention*, our city will soon be second to none in this first of earthly blessings; the appointment will not have been made in vain.

SECTION XIII.

RECOMMENDATIONS.

We accordingly offer to the Council the following recommendations :

1st.—To adopt the system of *Sewerage*—the system approved of by the Sanitary Commission, as reported by our colleague, Prof. Riddell—embracing streams of running water constantly through the streets, from the river or otherwise, from March to November, during the *day* only. Sewerage.

2d.—The *drainage*, in the most complete manner, of the neighboring swamps and levees on Lake Pontchartrain, to keep out the Lake water. This is to be effected by machinery and *covered drains*, and these to be dug in the winter season. After this is fully effected, in the opinion of your Health Department— Drainage.

3d.—The *removal of the forest growth*, excepting for avenues and parks. Forest growth

4th.—The completion of the pavage of the city (removal of the round stone) by square blocks, united by cement, and the avenues may be (temporarily) by thick planks. Paving,

5th.—The purchase and extension of the Water Works to every portion of the city, with fountains in each of the public squares. Waterworks.

6th.—An *extensive shed* the entire front of the business part of the city. Shed on river.

7th.—To plant trees in all the public squares and principal streets. Trees.

Gormley's basin.

8th.—To fill up *Gormley's Basin* and make a public square of it.

Covered drains.

9th.—To make *covered drains* of Gormley's and Melpomene's Canals, and all the other drains of the city.

Slaughter houses vacheries and Livery Stables.

10th.—That the *slaughter-houses* be removed to such distance from the city, and all *vacheries* and *livery stables* having over six animals, removed to squares having fifty population and ten dwellings. The same of soap and tallow chandleries, or other manufactories or pursuits that have a tendency, in the opinion of your Health Department, to impair the purity of the city atmosphere.

Privies.

11th.—The adoption of a *system of privies*, according with the recommendations in this Report.

Cemeteries.

12th.—To *discontinue interments* in the city limits.

Disturbing soil

13th.—To prevent any but the most superficial disturbances of the soil of the city or neighborhood, from 1st May to 15th October.

Health department.

14th.—To establish a *Health Department* on the plan detailed in the next section.

Quarantine.

15th.—To establish a quarantine station, not nearer than eight miles from the city, as a branch of the Health Department.

16th.—To carry out fully the system of privies described in another section of this Report.

Sanitary survey.

And finally; to order at an early day, a complete *Sanitary Survey* of the city before the warm weather sets in, under the instructions of the Health Department, of every house, lot and back yard in the city, to be most thorough and searching for every cause of disease, with plenary authority for that body immediately to abate it. To ascertain from every family the number that have not been vaccinated.

Book of record.

A book of record to be kept, wherein shall be recorded the reports from the Inpsectors of the special condition of every square in the city, with plans and diagrams, for present action and future reference, blanks being furnished by the Health Department, enumerating the duties and objects of the inspection.

SECTION XIV.

Ordinance for the Establishment of a Health Department for the City of New Orleans.

Be it ordained by the Common Council of the City of New Orleans:

SECTION 1.—There is hereby created a Health Department for the City of New Orleans.

Health Department to consist of Three Physicians.

SECTION 2.—This Department shall be constituted by the appointment of the City Council, in Joint Session, of a Board of not less than three Physicians of the City of New Orleans, eminent for their services, experience and practical knowledge of sanitary laws and influences, who shall have resided in the city at least ten years, and whose term of service shall be five years.

SECTION 3.—It shall be the duty of said Health Department to elect, on its first meeting, one of their number as presiding officer, who shall preside over its deliberations; be the organ of communication with this Council and the Public, and draw up the annual report.

President and his duties.

Duties of said Health Department.

SECTION 4.—It shall be the duty of this Department to have surveillance and control, under the orders of this Council, over everything that may affect the salubrity of the city of New Orleans, or have a tendency to impair the same; to visit and inspect all hospitals and infirmaries for the reception of the sick; to see that they do not admit any contagious disease; that they are kept in a cleanly and not crowded condition, having not more than one patient to every one thousand feet of space. They shall visit and inspect, likewise, all Jails, Lock-ups, Asylums, Boarding, or other Houses, liable to suffer from overcrowding or filth; Manufactories, Livery Stables, Vacheries, Slaughter-houses, and any place which it has reason to believe there may be a nursery of filth, impairing the purity of the air. That the space allowed in lodging-houses for each individual shall not be less than six hundred cubic feet of space for each adult. To see that the cemeteries are in a proper condition, with the power of removal for neglect.

Penalty for obstructing Inspectors of Health Department.

SECTION 5.—All persons occupying houses for lodgers, or where the said Department may have sufficient reason to believe there may exist a breach of this Ordinance, are hereby forbidden to obstruct the examination of the same by themselves or their Inspectors, under a penalty of fifty dollars for the first offence, one hundred dollars for the second, and five hundred dollars for the third, or taking away the license. And this sum shall be sued for and recovered before any Court having competent jurisdiction, and the said amount recovered shall be accounted for in the expenditures for the support of the same, and it shall be the duty of the City Attorney to prosecute for the same.

Section 6.—This Department shall keep an office in some central building, to which shall be placed in their special care, all the mortuary records of the city of New Orleans, and shall appoint their own Secretary, which office shall remain open during the usual hours of business, and the books and records of said Department shall always be open to the inspection of the members of this Council.

Office and Records.

Section 7.—It shall be the duty of this Department to have prepared and keep blank books for the following purposes:

1st. One containing an accurate record of each and every burial in each of the several cemeteries appertaining to this city, in which shall be recorded the name, birth-place, sex, color, age, period and place of residence in this city, and the cause of death of every one buried in any of said cemeteries.

Book of Record for each branch of the Health Department.

2d. A book to record the weekly or other reports of the Dispensary and other physicians, (hereafter mentioned.)

3d. A book to record the daily and weekly statements of the Inspectors, (hereafter mentioned.)

4th. A book to record the reports and applications of all the vidangeries.

5th. A book to record the reports of those selected to make the sanitary survey, from time to time.

Section 8.—It shall be their duty to select and license the Inspectors or Health Wardens for the city, whose number shall not exceed nine, and who shall serve, under the instructions of said Department, and whose duty it shall be to point out and order to be abated anything that may, in the opinion of said Department, impair the salubrity of the city. They shall also, license all Undertakers, Vidangeries, Sextons, and no others shall be recognized or perform the duties appertaining to those several callings, without such license, under a penalty of two hundred dollars. And it shall be the duty of said appointees to obey all the lawful orders of said Health Department relating to their said duties. And, further, it shall not be lawful for any Sexton to bury or any Undertaker to convey any body from or into the city of New Orleans, without having previously received an order to that effect from the Health Department, under the aforesaid penalty; and for a second offence, to be liable to a penalty of double the amount, and to be deprived of their license.

Number of Inspectors or Wardens.

Duty of.

To license Undertakers, Sextons, Vidangeries.

Penalty and duty.

A permit fr'm Health Department to authorize a burial.

Penalty for infraction.

Section 9.—It shall be the duty of said Inspectors, in the Districts to be appropriated to them by this Department, to be constantly occupied in visiting their several Districts, and to give a written report of the condition of every house, back-yard, privy, open lot, street, alley and building, mentioned in section four of this Ordinance, in writing, each week, under such

Duty of Inspector.

blank heads and instructions as the Health Department shall furnish.

Duty to have nuisances removed.

Section 10.—It shall be the duty of said Health Department to cause to be rendered at the expense of the proprietor or occupant of any house or premises, where there shall exist any nuisance—and everything is denominated an *nuisance* that, in the opinion of said Department, shall impair the purity of the air of the city—within a delay not exceeding one day in summer, and six in winter.

Empty lots to be filled.

Cemeteries disused.

Section 11.—It is hereby ordained that every empty lot shall be filled six inches above the crown of the street within sixty days after this Ordinance shall take effect. And that no Cemetery within the thickly inhabited parts of the city shall any longer be the receptacle for the burial of the dead, after the 30th April, inst.

Duties of Vidangeries.

Section 12.—It shall be the duty of the Vidangeries to have a permit from said Department previous to cleansing any privy, stating, in their application, (which shall be duly filed and recorded in a book appropriated to it,) the number, location and proprietor of the house whose privy it is his intention to clean.

Cemetery certificates.

From whom.

Section 13.—It is hereby made the duty of the physicians of this city, and of the families of all deceased persons, and attendants on such deceased, to give such information in relation to each deceased person as is required in section 7th of this Ordinance, under a penalty of fifty dollars, without which no burial certificate shall be issued, unless the Health Department is satisfied it *could not* be procured.

Districts nine, and on Dispensaries and Physicians to attend poor sick.

Section 14.—This city is hereby divided into nine Wards, in each of which there shall be established a Dispensary, under the instructions and surveillance of the Health Department, where medicines shall be distributed to the poor gratuitously, on the certificate and prescription of the Dispensary Physician of said Ward, on his being satisfied of the inability of the sick to pay for the same, which certificate shall be duly recorded as a voucher for the same.

District Physician—appointment, qualification.

Section 15.—The City Council shall elect immediately, and hereafter, in the first week in January of each year, a physician, duly qualified by experience of at least five years in this city, of the diseases of the climate, of education, of which a diploma from some recognized, respectable Medical College, shall be required, and of good moral character, to each Dispensary District.

Duty of ditto.

Section 16.—It shall be the duty of said Physicians to attend the poor of said Districts, respectively, gratuitously prescribing for them at the Dispensary, at some regularly appointed hour, and at their houses, when they shall be unable from disease to attend the said Dispensary; to vaccinate said poor, and to report the condition, as to salubrity, and of the character of the diseases prevailing, and a record of each case prescribed for, to the Health Department, in writing, weekly—in default of which the power of removal is hereby given to said Department, and temporary substitution, until his place shall be regularly filled by the Council.

Section 17.—The Health Department is hereby required to inspect the Quarantine Stations, which shall be considered but a branch of this Department, and advise with the Quarantine Physician on all subjects relating to his duty, and to see that the several officers attached to the Station perform in a proper manner, the duties required of them by law. And it is made the duty of the Quarantine Physician to report the condition of all vessels arriving at this port from any other port, as to cleanliness, and of the number and sanitary condition of her passengers and crew, and especially if any contagious, infectious, or febrile diseases shall be on board, and report. This shall be done (if the immediate advice or the action of the Health Department is required) at once: otherwise, weekly. It shall also be its duty to prepare from time to time, in conjunction with the Quarantine Physician, such rules and regulations as may be required for its government, subject to the approval of the Council.

To examine quarantine.

Report and duty of its Physician.

Section 18.—It shall be the duty of the Health Department, during the existence of any epidemic disease, to publish instructions to the public, succinctly embracing short advice on its prevention and treatment.

To publish advice during an epidemic.

Section 19.—It shall be the duty of said Health Department to keep a Meteorological Register, and record the temperature, barometer, winds, amount of rain and hygrometry of the atmosphere at least three times a day. To make and publish a weekly report of the number of interments in the city cemeteries, with such particulars in section seven as said Health Department may deem of interest to the public, with an abstract of the weather during the same period, and an Annual Report, with all the particulars bearing upon or appertaining to the salubrity of the city, with such suggestions for its improvement as it may recommend.

Meteorological record kept and published weekly, with Cemetery returns weekly.

Annual report

Section 20.—The compensation of the President of said Department shall be $3,000 per annum, and to each assistant $2,000 each; to the Secretary $1,200; and for office, stationery, blank books and blanks, and aid in organizing the office the first year, $2,000, or as much as may be required. To each Dispensary Physician $600 per annum; to the Inspectors, each

Compensation.

$500 per annum—to be paid monthly, on the order of the President of the said Department, and it shall be his duty to settle annually with the Comptroller the expenditures and receipts of his Department in January of each year.

Sanitary Survey.

SECTION 21.—It is hereby ordered that an immediate SANITARY SURVEY be made of the entire city, under the instructions of the said Health Department, who shall issue printed instructions to the Inspectors in blanks, and a plan of his District, and such other aid as they may require to facilitate it, embracing the following particulars, viz: The condition of every yard, whether paved or not, and how cleaned; the number, extent, and location of all lots that are below the level of the crown of the street; if supplied, and how, with water; the number of tenants and boarders in each house; the construction of each house—of wood or brick; the condition of the privies; the condition of every drain, canal and basin, and cemetery, and manufactory, slaughter-house, livery stable, and vachery, in each District; the condition of the levee and bank of the river and swamps contiguous to districts bordering thereon.

This inspection shall be recorded as the first in the Book of Record of Inspection, showing the exact condition of New Orleans on this foundation of a permanent Health Department for said city.

SECTION 22.—The Health Department is hereby authorized to furnish health certificates to the shipping, of the condition of the city, and to charge for the same $2 each to the domestic shipping, and to the foreign $5, and to account for the same in the annual settlement with the Comptroller.

SECTION XV.

Modes of Raising the Means necessary to Defray the Cost of the Recommendations.

No additional tax.

The large means required to carry out fully the views of the Sanitary Commission, and which is deemed requisite to restore this city to salubrity—to enable her fully to compete with any city of this Union, either in relation to health or the great purposes of commerce, we are fully sensible, she could not, at once' bear, under her ordinary resources, and it is farther obvious, that crippled as she has been, by the calamities of years, she cannot now sustain a heavier load of taxation than she is now laboring under. These, we fear, (if men submitted to) would farther tend to paralyse her recuperative energies, and put her beyond the possibility of competing with her more fortunate rivals.

It becomes our duty then, to point out some *extra means* beyond the ordinary resources of the city revenues, to accomplish objects in the highest degree urgent and important in themselves, and which we deem indispensible to her entire salubrity. Nor do we doubt could these objects be effected, she would be as healthy as any city in the Union. If some of these modes of raising this extra revenue are evils in themselves, they are certainly much less than those they will aid in effectually and permanently removing, and be of but a temporary character in themselves.

Sale of swamp lands.

1st.—The city Council might reasonably expect from the fund derivable from the sale of swamp lands......$200,000

Public lands from the United States.

2nd.—Three years ago a recommendation was made by the late *General Council of the city*, that an application should be made to the EIGHTEEN States directly interested in its salubrity, to induce them to unite in recommending to the General Government to transfer to this city 200,000 acres of public land, for which purpose it created a Board called "*The Permanent Sanitary Board*,"—whose duty it was made to initiate the necessary steps to obtain it. That Board organized and drew up a Report—in which the claims of New Orleans was set forth,—through which it was clearly demonstrated that *there had been expended* by this city and the State of Louisana for the actual and prospective population of these States not less than $2,000,000, and that it was morally and equitably right, that that sum ought to be considered due. The Report was approved of by the Board, but there required an outlay of some $200 or $300 for printing, &c., and as there was no sum appropriated nor could be procured, nothing farther could be done. The claim is deemed a *just* one, and if the proper steps were taken, a large sum could most probably be raised from it.

A reconstruction of that board is recommended, or its duties might be devolved upon the health department. As this will require time, no amount is put down as arising from this source.

McDonogh's bequest.

3d—The estate of the late John McDonogh, will have a contingent fund to be available after some years. It is believed that a considerable sum could be raised from this source; it could be used on the basis on which a sum could be obtained on credit, say.................................... $35.000

Tonnage duty.

4th—The President of the United States has advised, in his message to Congress, that a tonnage duty on all vessels visiting the several ports and harbors, be left at the disposal of the States respectively. This would be just, as enabling each to collect a large amount of money, required and received in proportion to the importance of the port, to be appropriated to the wants and requirements of these ports, to facilitate the various advancements and conveniences of commerce.

There would be a very large amount derivable from this prolific source, say only.....................$500.000

Loan from McDonogh's estate.

5th—The final adjudication, by the Supreme Court of the United States, of the large estate of Mr. McDonogh to the cities of New Orleans and Baltimore, leaves subject to the control of this city a large sum, which it has been proposed to invest in railroad stock. It is conceived that the *first* interest of New Orleans is its *salubrity;* all else should be considered subsidiary to this. Railroads are the *second* great duty of this city; but without health, they only make a great winter factorage of it. *With health,* railroads will make it second to no city on the continent. Its salubrity, and *its reputation for salubrity*, must *precede it, now its reputation is gone.*

The amount to be derived from this source is very large, say.................................$400.000

6th—A special tax on the property of absentees is not constitutional, but some means should be devised by which to apportion, somewhat more equitably than is now done, the various incumbrances of civil government—the benefits and burthens; and particularly during epidemics, these latter are very onerous on those who remain to discharge faithfully their duties to society.

The authorization to raise a certain sum by lottery to be solely appropriated to the removal of the causes influencing the salubrity of the city.

Here then is the enormous sum of...........$1.435.000 besides the contingencies that have not been estimated, but little more than half of which, would make New Orleans one of the healthiest cities on the continent, and one of the most desirable residences; put her in the front rank of American cities, and with her railroads, defy all competition.

A TABLE
OF THE
Deaths in New Orleans during the year 1853;
Showing for each Class of Diseases the total Mortality, and that of each Month;
ALSO, THE SEXES AND COLORS WITH THE AGES AND PLACES OF NATIVITY;
COMPILED FOR THE SANITARY COMMISSION BY D. MACGIBBON, M. D.

DISEASES.			MONTHLY MORTALITY.												SEXES AND COLOR.									AGES.															NATIVITY.																
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	White, Males.	White, Females.	Colored, Males.	Colored, Females.	Sex, but not color stated, M.	F.	Color, but not sex stated, White.	Colored.	Neither sex nor color stated.	Under one month.	Do. one year.	Do. five years.	Do. ten years.	Do. twenty years.	Do. thirty years.	Do. forty years.	Do. fifty years.	Do. sixty years.	Do. seventy years.	Do. eighty years.	Do. ninety years.	Do. one hundred years.	Above one hundred years.	Not stated.	New Orleans.	Louisiana, Mississippi, Alabama, Ga., S. Carolina, & Texas.	North Carolina, Virginia and Maryland.	North Western States.	Northern States.	British America.	Great Britain.	Ireland.	Germany.	France.	Holland and Belgium.	Austria, Poland, Prussia and Denmark.	Norway and Sweden.	Spain and Italy.	West Indies, Mexico and South America.	Not stated.	Total.
CLASS I. EPIDEMIC.																																																						
Yellow Fever		7849	1	...	...	...	2	31	1521	5133	982	147	28	4	5293	2475	17	21	...	...	37	5	1	7	90	196	197	1598	3310	1238	436	180	54	15	3	...	...	525	87	28	54	63	112	7	132	1842	1209	271	48	84	7	46	4	3855	
CLASS II. ENDEMIC.																																																						
Cholera	585		25	3	2	11	9	14	5	1	...	6	177	332	324	157	51	48	1	2	1	1	...	1	28	85	30	61	149	101	39	22	8	2	3	...	...	56	75	2	3	1	4	1	4	149	30	7	...	...	...	3	1	305	
Cholera Morbus	35		2	1	...	...	...	...	...	8	4	...	13	7	17	8	6	3	...	...	...	1	...	3	1	6	2	6	8	...	4	2	1	...	...	...	...	2	...	...	...	...	...	...	...	1	6	...	...	1	1	1	...	25	
Cholera Infantum	75		5	...	2	5	15	6	8	5	9	4	7	9	28	27	7	9	1	...	1	2	...	9	33	19	...	...	...	...	...	...	...	...	...	...	...	14	25	4	...	...	...	...	1	1	2	...	...	1	...	...	...	41	
Dysentery	232		17	10	8	13	22	25	30	16	14	29	35	13	136	75	15	4	...	...	2	...	...	4	33	34	8	19	48	31	23	14	1	2	...	...	...	15	32	1	2	3	...	2	7	29	15	4	3	...	2	2	1	129	
Dysentery, Chronic	38		4	6	2	1	4	1	...	...	...	...	10	10	23	8	4	3	...	...	...	...	...	...	1	3	2	3	10	8	7	...	...	...	...	...	...	4	2	...	...	...	1	...	1	12	3	...	...	...	...	1	...	18	
Diarrhœa	225		20	8	7	16	36	23	29	25	14	17	14	16	133	68	12	4	...	...	5	2	1	5	45	37	10	14	31	35	15	6	3	...	1	1	...	22	27	1	...	1	5	4	7	24	25	4	1	3	...	1	1	121	
Diarrhœa, Chronic	42		3	3	2	2	7	1	5	...	...	...	11	8	23	11	6	2	...	...	...	...	...	1	4	6	...	2	5	5	8	4	...	1	1	...	...	5	5	...	...	...	1	...	3	5	2	1	...	...	...	...	...	25	
Malignant Fever	34		...	...	...	6	10	12	6	...	...	...	...	...	19	6	5	4	...	...	...	...	...	...	1	7	...	9	9	2	2	1	1	...	...	...	...	2	1	...	...	...	...	...	...	8	4	1	...	...	1	...	1	18	
Pernicious Fever	152		4	4	1	...	...	...	18	54	52	16	...	3	77	52	10	7	2	...	4	...	...	1	7	33	17	14	32	16	3	5	3	2	3	...	...	16	9	2	...	...	2	...	3	3	12	6	...	...	...	2	...	113	
Congestive Fever	77		5	...	...	3	3	11	19	25	9	...	2	...	51	21	2	3	...	...	...	...	...	...	4	6	7	6	26	10	5	3	...	...	...	...	...	10	5	1	2	1	...	...	2	15	5	4	1	2	...	...	...	39	
Remittent Fever	29		1	1	...	1	...	7	9	5	3	1	1	...	15	9	3	2	...	...	...	...	...	...	1	7	1	5	9	3	...	...	1	...	...	...	...	2	2	1	...	1	...	...	2	7	...	1	...	...	...	...	...	15	
Intermittent Fever	38		2	2	3	2	5	2	6	10	1	1	2	2	27	7	2	1	...	...	...	1	...	...	5	5	...	1	6	8	6	3	1	...	1	...	...	2	5	...	...	1	...	...	...	8	4	1	1	...	1	...	...	16	
Bilious Fever	21		...	...	...	...	3	5	7	2	...	3	1	...	16	5	...	...	...	...	...	...	...	...	1	1	1	...	7	5	3	1	1	1	...	...	...	1	1	...	...	...	...	...	1	5	7	1	...	1	...	...	...	5	
Typhus Fever	103		15	9	11	7	6	9	19	13	...	3	4	7	55	43	3	2	...	...	...	...	...	...	1	8	2	18	38	12	6	3	...	...	...	...	...	14	4	...	1	1	...	2	4	34	7	6	...	1	...	1	...	32	
Typhoid Fever	146		13	7	5	17	12	9	10	21	24	7	8	13	78	50	9	8	1	...	...	...	...	...	4	9	11	18	38	32	12	7	5	...	...	...	...	10	7	2	4	1	3	1	3	22	12	6	2	...	...	...	...	83	
Other Fevers	69		8	6	6	2	4	9	5	17	3	5	1	3	38	25	3	3	...	...	...	...	...	1	9	11	5	2	16	12	2	...	1	...	1	...	...	9	8	1	...	...	...	...	1	12	6	1	1	...	...	1	...	38	
Erysipelas	18		...	2	1	3	2	...	6	1	1	1	1	...	12	2	3	1	...	...	...	...	...	1	1	1	...	...	4	2	1	4	1	...	...	1	...	2	2	1	...	...	...	1	1	2	1	...	...	...	...	...	...	10	
Croup	35		8	3	4	...	3	1	1	2	5	3	3	2	17	11	3	4	...	...	...	...	...	5	13	11	3	...	...	...	...	...	...	...	...	...	...	3	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	24	
		—1954	133	65	54	89	144	166	1704	5338	1121	243	318	431	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
CLASS III. MONOXYSMAL.																																																						
Pertussis	44		3	...	1	3	5	3	7	5	...	8	5	4	14	22	2	3	...	...	2	1	...	...	14	18	5	1	2	...	...	...	...	...	...	...	...	4	8	...	1	...	...	...	...	2	...	1	...	...	...	...	...	32	
Measles	124		1	4	5	20	53	30	7	1	2	1	...	...	44	49	9	17	...	...	3	1	1	2	37	64	8	3	1	...	...	...	...	...	...	...	...	9	31	3	...	1	...	...	...	3	4	1	1	...	...	...	...	80	
Scarlatina	126		20	24	20	17	25	13	1	1	1	...	...	4	41	59	9	12	...	...	3	2	...	4	18	59	26	6	1	3	...	1	1	...	...	...	...	7	13	1	...	...	...	...	2	3	...	...	...	...	...	...	1	96	
Variola	17—	311	2	6	...	2	3	2	...	1	1	...	...	...	9	3	1	2	...	...	2	...	...	...	2	4	...	...	2	2	...	2	...	...	...	...	...	5	2	...	...	...	...	...	...	3	1	...	...	...	...	...	...	11	
CLASS IV. VARIABLE.																																																						
Scrofula	17		2	1	...	2	4	3	1	1	...	...	2	1	8	1	3	4	...	...	1	...	...	...	1	5	2	2	2	1	1	...	...	...	...	...	...	3	2	2	...	1	...	...	...	1	1	...	...	...	...	...	...	10	
Marasmus	100		5	3	7	1	13	7	10	11	9	14	11	9	41	41	7	8	...	...	3	...	...	8	40	30	6	1	2	3	1	2	...	...	...	...	...	7	34	...	1	...	1	...	1	4	2	...	...	...	...	...	...	57	
Debility	213		8	6	3	22	43	26	22	30	13	15	11	14	93	81	12	15	...	...	5	4	...	37	46	29	3	4	4	11	4	7	15	6	2	2	...	43	97	1	1	3	2	...	2	14	9	1	1	...	...	1	...	81	
Teething	143		3	...	5	12	24	12	11	15	17	14	15	15	66	54	10	9	...	...	2	2	...	2	75	58	1	...	...	...	...	...	...	...	...	...	...	7	50	3	...	1	...	...	1	1	4	4	...	...	...	...	...	79	
Dropsy	84		9	9	3	4	8	2	...	10	12	13	5	9	34	27	9	12	...	...	...	2	...	...	2	10	4	1	11	15	14	7	9	3	2	...	...	6	2	2	...	...	4	...	...	10	10	2	...	...	...	1	...	53	
Hæmorrhage	16		1	1	2	2	1	...	...	...	6	...	2	1	9	2	4	1	...	...	...	...	...	...	1	1	...	2	6	1	1	2	...	...	...	...	...	2	3	...	...	...	...	...	...	2	2	...	...	...	...	...	...	9	
Gangrene	20		1	2	...	1	3	...	1	1	5	6	...	...	15	1	2	1	...	...	...	1	...	...	1	3	6	2	2	1	3	1	...	...	...	...	...	1	1	1	...	...	...	1	...	...	1	...	...	...	...	...	...	16	
Cancer	10		2	...	...	2	1	...	1	3	1	...	...	...	2	...	4	4	...	...	...	...	...	...	...	...	1	1	2	2	1	1	1	...	...	...	...	1	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	8	
Abscess	9		...	...	...	1	2	...	4	...	...	1	1	...	6	...	2	...	...	...	1	...	...	...	...	...	...	2	2	2	1	1	...	...	...	...	...	1	1	...	...	...	...	...	...	1	...	1	...	...	...	...	...	6	
Non-Viable	13		...	...	1	6	3	...	...	...	...	...	2	1	3	2	1	1	1	...	1	4	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	10	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Other Diseases	80		21	15	11	5	3	6	3	5	2	1	3	5	36	26	7	5	...	...	2	2	2	13	11	5	2	4	8	11	12	2	2	...	...	...	...	10	9	3	2	...	1	...	...	4	4	2	...	...	...	2	...	53	
Not stated	1150—	1855	100	66	78	20	27	57	113	345	115	83	85	61	612	433	26	25	...	1	35	8	10	109	199	95	28	84	179	85	39	22	14	5	1	...	...	290	193	2	2	1	3	1	6	295	42	8	2	1	1	3	1	589	
CLASS V. NERVOUS.																																																						
Apoplexy	127		10	11	6	13	7	10	21	17	8	4	8	12	77	25	12	18	...	...	...	1	...	...	2	...	1	3	22	22	24	13	10	7	6	1	...	17	6	1	...	3	2	1	3	10	13	5	2	...	1	1	1	78	
Congestion of Brain	111		7	3	5	7	8	10	12	21	12	10	4	12	57	23	17	9	...	...	5	...	...	3	14	26	4	5	5	16	11	13	2	1	...	...	...	11	10	...	...	...	2	...	2	17	2	3	...	...	...	...	...	75	
Cephalitis	134		5	3	4	8	9	10	18	35	27	4	6	5	62	43	10	7	...	...	10	2	...	7	37	38	4	9	7	10	5	...	3	...	1	2	...	10	25	1	1	...	2	...	3	3	6	1	...	...	4	...	...	88	
Meningitis	61		...	4	1	12	5	6	7	10	7	1	5	3	24	20	12	5	...	...	...	...	...	3	8	29	8	3	3	3	1	1	...	...	...	...	...	2	5	...	...	...	2	...	...	3	...	...	...	...	...	...	...	51	
Epilepsy	13		...	1	...	...	1	2	4	1	2	1	...	1	7	2	3	1	...	...	...	...	...	...	2	1	1	1	1	2	1	1	1	...	...	...	...	2	2	...	...	...	...	...	...	2	...	...	...	...	1	...	...	8	
Hydrocephalus	24		...	2	...	3	3	4	2	1	3	1	2	3	13	8	1	1	...	...	1	...	...	...	8	11	1	...	1	1	...	1	...	...	...	...	...	1	10	...	...	...	...	...	...	1	1	...	...	...	...	...	...	12	
Convulsions	465		22	16	22	38	42	53	44	107	39	26	30	26	216	167	25	21	...	2	20	12	2	98	141	128	19	11	9	3	2	...	...	...	...	...	...	54	165	3	2	2	1	...	3	11	9	6	1	...	...	1	1	260	
Tetanus	49		3	5	2	2	8	2	3	3	6	5	5	5	23	15	4	4	...	...	2	...	1	2	5	4	5	9	6	4	2	1	...	...	...	...	...	17	11	...	...	...	...	...	1	7	4	...	...	1	...	...	...	25	
Trismus Nascentium	144		10	9	6	8	8	5	14	13	25	15	15	16	56	42	8	9	...	...	19	8	2	144	...	...	...	...	...	...	...	...	...	...	...	...	...	...	144	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Paralysis	15		...	1	...	1	4	1	...	1	2	1	1	3	6	4	4	1	...	...	...	...	...	...	...	...	2	1	6	1	...	1	...	1	...	...	...	3	1	...	...	...	...	...	...	4	2	...	...	...	...	...	...	8	
Other Diseases	18		3	4	3	3	1	2	...	...	...	1	1	...	4	5	2	7	...	...	...	...	...	2	...	3	...	3	3	2	2	1	2	...	...	...	...	...	2	...	1	2	...	...	...	...	...	1	...	...	...	...	...	12	
		—1161	60	59	49	95	96	105	135	209	131	69	77	86	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
CLASS VI. RESPIRATORY.																																																						
Laryngitis	6		1	1	1	1	2	...	...	...	...	...	...	...	1	3	...	...	...	...	2	...	...	1	...	3	...	...	...	1	...	...	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	
Bronchitis	64		7	8	8	8	8	2	3	6	4	2	3	5	28	16	5	11	...	...	...	4	...	...	6	10	...	6	5	5	12	2	2	3	...	...	...	7	6	1	...	...	2	...	...	4	3	3	1	...	1	...	1	42	
Pleurisy	10		3	1	1	1	1	1	...	1	...	...	...	1	7	1	...	2	...	...	...	...	...	...	1	...	...	1	3	4	...	2	...	...	...	...	...	1	...	1	...	...	1	...	...	2	...	...	...	...	...	1	...	5	
Pleuro-Pneumonia	17		1	2	3	4	4	...	...	...	...	2	...	1	13	2	2	...	...	...	...	...	...	...	2	1	...	...	3	6	1	4	...	...	...	...	...	...	1	...	1	1	...	...	1	3	1	...	...	...	...	...	...	9	
Pneumonia	167		21	23	27	27	11	11	5	10	8	8	5	11	68	30	39	28	...	...	1	1	...	2	19	23	7	15	37	21	12	9	7	2	...	...	...	13	19	1	4	2	1	...	1	15	4	2	...	1	1	1	...	115	
Consumption	755		73	70	73	66	72	49	53	60	57	60	60	62	372	206	80	89	...	...	4	4	...	4	21	44	16	62	238	154	77	44	12	3	1	1	...	78	44	8	17	11	19	3	15	124	44	17	5	5	4	9	4	427	
Catarrh	30		...	3	4	8	1	4	...	1	4	4	...	1	12	2	6	10	...	...	...	...	...	4	10	4	4	...	1	1	...	1	2	1	1	...	...	1	4	...	...	...	...	...	...	...	1	...	...	...	1	...	...	24	
Asthma	7		...	...	...	1	...	...	...	1	2	...	1	2	4	1	...	1	...	...	1	...	...	...	...	...	...	...	1	...	1	...	3	1	1	...	...	...	...	1	...	...	...	...	1	...	1	...	...	...	...	...	...	4	
Other Diseases	42		3	2	7	7	3	6	2	5	1	3	2	1	26	9	4	2	...	...	...	1	...	1	3	4	5	2	5	8	2	5	2	...	...	...	...	5	6	1	...	1	...	...	1	5	1	2	...	1	...	1	1	22	
		—1098	109	110	124	123	102	73	63	84	76	79	71	84	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
CLASS VII. CIRCULATORY.																																																						
Pericarditis	9		2	...	...	3	2	...	1	...	...	...	1	...	7	...	1	1	...	...	...	...	...	...	...	...	3	1	1	3	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	1	...	6	
Organic Disease of Heart	19		3	5	...	1	...	...	...	...	...	4	2	4	7	2	4	3	...	...	...	1	1	3	...	2	1	...	1	3	...	1	1	1	...	...	...	6	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	17	
Other Diseases of Heart	41—	69	...	2	4	10	8	3	1	4	3	1	1	4	16	8	4	11	...	...	1	...	1	2	1	2	1	5	6	7	4	2	2	2	...	...	...	7	2	...	...	1	...	...	1	5	1	1	...	...	...	...	2	28	
CLASS VIII. DIGESTIVE.																																																						
Gastritis	35		4	3	3	8	6	4	3	...	...	1	3	...	18	9	2	8	...	...	...	...	...	...	8	7	...	...	5	1	10	1	...	1	...	...	...	2	3	1	...	...	...	...	1	5	...	1	...	...	...	...	...	24	
Gastro-Enteritis	97		4	3	4	15	6	6	10	9	7	13	6	14	36	36	12	12	1	...	...	...	...	7	13	8	3	5	7	10	13	6	3	...	1	...	...	11	6	1	2	1	1	...	2	5	3	3	...	...	...	1	...	72	
Enteritis	133		7	8	8	...	12	17	19	28	13	6	7	8	56	45	15	15	...	...	2	...	...	5	31	31	5	6	11	7	7	5	5	1	1	3	...	15	18	1	1	...	2	...	...	2	7	...	...	...	...	...	...	102	
Peritonitis	24		2	1	1	2	3	...	3	4	2	1	3	2	11	5	3	4	...	1	...	...	...	...	1	2	1	4	6	4	1	...	...	...	...	...	...	5	1	...	...	...	...	...	...	2	...	...	...	1	1	...	...	19	
Cancer of Stomach	8		3	1	...	1	1	1	1	...	...	...	...	...	3	4	...	1	...	...	...	...	...	...	...	...	...	1	1	3	...	1	...	1	...	...	...	1	1	...	...	...	...	...	1	3	...	...	...	...	...	...	...	3	
Worms	19		2	1	1	3	2	...	3	4	2	1	...	...	7	7	...	4	...	...	1	...	...	...	4	9	4	...	...	...	...	...	...	...	1	...	...	1	5	...	...	...	1	...	...	1	2	...	...	...	...	...	...	10	
Colic	6		...	1	...	...	2	1	1	1	...	...	...	...	2	1	1	2	...	...	...	...	...	1	...	...	...	...	...	4	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	2	...	...	...	...	...	...	2	
Tabes Mesenterica	21		...	...	...	...	1	8	5	1	...	1	3	2	13	5	1	2	...	...	...	...	...	...	7	7	2	1	...	1	...	...	1	...	...	...	...	2	4	...	...	...	...	...	...	2	2	...	...	...	...	...	...	13	
Ascites	20		2	...	...	1	2	4	4	...	...	4	3	...	13	2	2	3	...	...	...	...	...	...	...	3	...	2	3	2	4	1	1	2	...	...	...	2	2	...	...	...	1	...	...	1	1	1	...	...	...	...	...	14	
Other Diseases	27		3	5	6	...	1	3	2	1	3	...	2	1	7	14	4	1	...	...	...	1	...	1	1	4	1	2	6	4	3	1	2	...	1	...	...	1	...	...	3	1	...	1	...	1	2	...	1	...	...	...	...	18	
Hepatitis	38		4	4	5	2	4	3	1	4	4	2	3	2	22	11	4	1	...	...	...	...	...	...	...	2	2	1	6	9	6	4	1	1	...	...	...	6	2	...	1	...	...	...	...	7	3	2	...	...	1	...	...	22	
Cirrhosis	6		...	...	...	2	...	1	2	...	1	...	...	...	5	1	...	...	...	...	...	...	...	...	...	...	...	...	1	3	2	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	4	
Jaundice	4		...	...	...	...	1	...	...	1	1	...	1	...	1	3	...	...	...	...	...	...	...	1	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	1	
Other Diseases of Liver	12—	450	1	...	2	...	2	6	...	...	...	...	1	...	8	1	1	2	...	...	...	...	...	...	1	...	...	1	2	4	1	...	1	...	...	...	...	2	1	1	...	1	1	...	...	1	2	...	2	...	...	...	...	3	
CLASS IX. URINARY.																																																						
Urinary		4	...	1	...	...	...	...	...	...	1	2	...	...	3	...	1	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	3	
CLASS X. OF MALES.																																																						
Of Males			...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
CLASS XI. OF FEMALES.																																																						
Child Birth	20		1	1	5	...	1	1	...	4	3	1	3	...	...	15	...	5	...	...	...	...	...	...	...	...	...	3	9	3	...	...	...	...	...	...	...	5	2	...	...	...	...	...	...	8	3	...	...	...	...	...	...	7	
Puerperal Fever	15		2	1	...	2	2	2	1	1	2	1	...	1	...	14	...	1	...	...	...	...	...	...	...	...	...	...	7	6	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	3	...	2	...	1	...	...	...	9	
Cancer of Womb	6		1	...	...	...	2	...	1	1	...	1	...	...	...	4	...	2	...	...	...	...	...	...	...	...	...	1	...	2	1	2	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	4	
Other Diseases	15—	56	...	...	2	2	2	4	2	...	...	2	1	...	...	11	...	4	...	...	...	...	...	...	...	...	...	1	3	1	5	...	...	...	...	...	...	5	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	13	
CLASS XII. LOCOMOTIVE.																																																						
Rheumatism		12	...	...	2	2	2	1	...	2	1	...	1	1	5	6	...	1	...	...	...	...	...	1	1	...	...	...	2	1	2	2	...	1	...	...	...	2	1	...	...	...	1	...	1	1	2	...	1	...	...	...	...	5	
CLASS XIII. INTEGUMENTARY.																																																						
Integumentary		7	...	...	...	...	...	2	2	...	1	1	...	1	3	1	3	...	...	...	...	...	...	...	2	1	...	...	...	1	2	...	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	5	
CLASS XIV. OF SENSES.																																																						
Of Senses			...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
CLASS XV.																																																						
Old Age		53	6	7	1	1	...	3	5	1	...	9	9	11	13	15	6	18	...	1	...	...	...	...	...	...	...	...	...	...	1	4	8	17	7	6	1	9	4	...	...	...	...	...	1	9	3	...	1	...	...	...	1	31	
CLASS XVI.																																																						
Still Born		346	23	27	26	21	18	42	31	35	30	44	23	26	102	73	18	14	...	...	102	24	13	346	...	...	...	...	...	...	...	...	...	...	...	...	...	...	346	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
CLASS XVII. CASUALTIES.																																																						
Casualties	61		7	5	3	2	2	1	3	...	11	7	5	15	44	5	9	3	...	...	...	...	...	4	3	1	2	5	7	16	9	3	2	...	...	...	...	9	4	1	...	1	1	...	...	14	2	3	...	...	...	...	...	35	
Sun Stroke	21		...	...	...	...	...	9	7	5	...	...	...	...	16	4	...	1	...	...	...	...	...	...	...	...	...	1	8	6	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	7	5	...	...	...	...	...	...	9	
Drowned	105		5	6	4	6	13	10	13	15	6	9	8	10	90	4	8	1	...	...	2	...	...	1	2	5	3	11	31	26	4	2	...	...	...	...	...	20	3	...	...	...	2	1	1	7	2	2	...	...	...	...	...	87	
Burns and Scalds	18		...	...	...	1	2	2	...	2	2	2	1	6	5	6	2	5	...	...	...	...	...	...	2	2	2	1	4	...	1	1	1	...	...	...	...	4	3	...	...	...	...	...	1	2	...	...	...	...	...	...	1	11	
Hydrophobia	6—	211	...	...	1	...	...	...	...	1	2	...	...	2	2	4	...	...	...	...	...	...	...	...	1	1	1	...	...	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	4	
CLASS XVIII. EXOPATHIC.																																																						
Poisoned	4		2	...	...	...	...	1	...	...	...	1	...	...	3	1	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	3	
Wounds	47—	51	6	4	6	10	2	2	6	2	4	3	...	2	33	7	6	1	...	...	...	...	...	2	...	4	2	5	16	3	1	1	...	...	...	...	...	13	2	...	1	...	...	...	...	19	5	1	...	2	...	1	...	25	
CLASS XIX. ESOPATHIC.																																																					
Intemperance	123		9	5	8	7	9	14	14	13	15	8	12	9	91	20	8	4	...	...	...	...	...	...	...	...	...	5	34	37	19	10	7	...	1	...	...	10	4	...	3	2	2	...	3	29	7	1	1	1	...	1	1	68	
Syphilis	6		1	1	...	1	1	...	...	...	...	...	1	...	3	3	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	4	
Suicide	14—	143	1	...	1	2	2	...	2	1	...	2	3	...	11	2	...	1	...	...	...	...	...	...	1	1	...	1	1	2	1	...	1	...	...	...	...	6	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	13	
CLASS XX. TREATMENT.																																																						

TABLE C.

Monthly Returns from each of the Cemeteries.

1853.	Jan.	Feb.	Mar	A'ril	May	Ju'e	July	A'g.	Sep.	Oct.	o v	Dec	Total.
Cypress Grove No. 1	24	28	23	36	31	34	43	151	53	25	18	14	480
No. 2, or Pottersfield	61	56	53	55	73	56	139	1424	361	127	150	135	2690
Odd Fellows' Rest	2	4	5	7	..	11	13	52	14	7	4	2	121
St. Patrick's	5	57	68	63	95	123	486	1038	262	86	127	102	2558
Charity Hospital	89	67	85	69	72	94	604	917	227	184	122	108	2638
Lafayette, or 4th District	92	69	84	82	121	137	469	1177	207	74	110	124	*2696
St. Vincent de Paul	89	86	79	82	146	104	224	1040	302	93	82	119	*2446
Hebrew, on the Ridge	2	..	3	4	..	1	...	7	2	2	1	...	22
Hebrew, Lafayette	....		....	....	1	2	25	71	12	2	4	7	*124
Protestant	30	29	31	29	38	22	60	218	68	29	33	47	*633
St. Louis No. 1	17	23	18	27	18	14	20	67	39	33	22	35	*334
St. Louis No. 2	61	68	59	56	79	70	49	136	74	38	74	66	*830
Totals	518	487	508	510	676	668	2132	6298	1621	700	747	759	15572

* Those thus marked (*) are within the city limits, and amount to 7063.

EXPLANATION.

There are some discrepancies in the report in relation to the monthly mortalities—the monthly returns by the cemeteries—the aggregate mortality for the entire year, and number in the tabular return of yellow fever cases, with those from which I have made my calculations, which require notice.

For the first three, one explanation will suffice, for about *one-third* of the year was there an *authorized board* to record the number, and the cause of death—for the balance of the year it has been difficult to get the cemetery returns and they do not correspond.

In relation to the number of deaths by yellow fever, many were stated as "unknown" "unspecified"—whose deaths were probably caused by yellow fever;—anxious to arrive as near the truth as possible, the Sanitary Commission has authorized me, during the epidemic, to add a large portion of these to the yellow fever mortality, which I have done in the daily returns in the tables C, D, E.

[TABLE N.]

Meteorology of New Orleans, for the Year 1853.

MONTHS.	THERMOMETER—OUTSIDE.						Temperature of the Mississippi	DEW POINT.					TEMPERATURE OF EVAPORATION.			
	Average at sunrise.	Average at 9, A. M.	Average at midday.	Average at 9, P. M.	General average.	Range.	Av'ge temperature of the river at 6 A.M. daily	Average at sunrise.	Average at midday.	Average at 9, P. M.	Aver'ge for the month.	Range.	Average at sunrise.	Average at midday.	Average at 9, P. M.	Monthly average.
January	44.22	48.20	53.90	40.00	47.00	37.50	47.24	42.36	45.50	46.95	44.93	28.2	43.51	53.54	48.20	48.38
February	50.01	56.14	63.03	54.93	56.05	49.50	42.68	48.24	50.72	52.80	50.48	36.4	49.35	57.21	53.96	53.54
March	55.83	63.45	69.29	61.16	62.43	35.00	59.23	54.19	55.56	58.76	56.17	34.2	55.09	61.90	59.90	56.63
April	62.20	72.16	78.90	68.33	70.37	35.00	67.09	61.33	62.79	65.70	66.69	30.0	65.03	68.16	66.73	66.64
May	66.03	76.06	80.22	72.19	73.82	28.00	69.85	65.01	67.59	68.82	67.11	23.9	65.58	69.90	69.83	68.43
June............	75.51	83.40	85.26	78.76	80.73	21.00	76.28	72.58	72.20	74.82	73.27	14.6	73.48	75.53	75.86	74.95
July	76.85	82.03	82.18	75.41	79.88	18.00	81.52	74.59	71.06	70.14	72.13	14.4	75.14	76.69	76.66	76.16
August..........	76.27	83.10	83.82	78.75	81.25	19.00	81.40	74.65	74.69	75.92	75.08	13.2	75.10	76.96	76.33	76.13
September......	72.30	77.60	80.26	74.76	76.23	26.00	82.13	70.48	70.75	71.86	70.93	28.0	70.90	73.53	72.90	72.44
October........	67.37	67.09	72.38	65.58	66.81	30.00	71.66	58.08	58.87	61.99	59.31	42.6	60.10	64.25	62.67	62.34
November.......	60.83	65.10	69.80	64.00	64.92	30.00	59.11	58.06	59.85	60.68	59.46	33.4	59.70	63.73	62.13	61.85
December.......	49.61	52.86	56.93	52.74	53.06	9.32	43.91	45.42	48.22	47.58	46.07	40.8	47.70	53.58	50.74	50.67
Total averages..	62.69	68.94	72.41	67.13	67.79	27.36	63.34*	68.95	60.64	63.00	61.78	24.97	61.72	66.25	64.66	64.01
Annual averages	67.79							61.78					64.01			

MONTHS.	DRYING POWER, OR FORCE OF EVAPORATION.					BAROMETER.						MOISTURE. (1000 being saturation.)					EXTREMES OF MOISTURE.		WEIGHT OF VAPOR IN A CUBIC FOOT, IN GRAINS.			
	Average at sunrise.	Average at midday.	Average at 9, P. M.	Monthly average.	Range.	Average at sunrise.	Average at 9, A. M.	Average at midday.	Average at 9, P. M.	Monthly average.	Range.	Average at sunrise.	Average at midday.	Average at 9, P. M.	Monthly average.	Range.	Maximum: 0 being saturation.	Minimum.	Average at sunrise.	Average at midday.	Average at 9, P. M.	Monthly average.
January	1.86	8.30	2.08	4.08	23.2	30.287	30.355	30.290	30.322	30.313	.79	.933	.777	.938	.882	.541	1(at 26 obs'ns.	.459	3.531	3.890	4.132	3.851
February	1.86	12.31	2.13	5.43	17.4	30.243	30.266	30.204	30.420	30.238	11.7	.945	.666	.926	.845	.464	0 " 26 obs'ns.	.536	4.294	4.535	4.908	4.579
March	1.64	13.73	2.40	5.92	30.4	30.263	30.294	30.235	30.259	30.262	.54	.946	.642	.910	.832	.649	0 " 29 obs'ns.	.351	5.187	5.282	5.973	5.381
April	.87	16.11	2.63	6.53	28.5	30.257	20.290	30.241	30.251	30.260	.33	.969	.609	.921	.833	.613	0 " 20 obs'ns.	.387	6.447	6.531	7.436	6.804
May	1.02	12.72	3.37	5.70	19.1	30.226	30.264	30.228	30.230	30.237	.33	.969	.665	.892	.842	.474	0 " 29 obs'ns.	.526	7.188	7.592	8.023	7.601
June............	2.93	13.06	3.94	6.64	22.9	30.251	30.281	30.239	30.254	30.256	5.66	.899	.663	.884	.815	.509	0 " 3 obs'ns.	.491	9.028	8.732	9.648	9.136
July	2.26	11.12	5.27	6.21	15.8	30.269	30.280	30.258	30.264	30.265	5.07	.930	.703	.842	.825	.390	0 " 5 obs'ns.	.610	9.600	8.480	8.315	8.798
August..........	1.62	9.13	2.83	4.52	18.3	30.194	30.222	30.181	30.181	30.194	.25	.950	.756	.915	.873	.448	0 " 14 obs'ns.	.552	9.651	9.515	10.045	9.737
September......	2.12	9.51	2.90	4.84	20.7	30.185	30.217	30.173	30.192	30.191	.31	.932	.732	.908	.857	.498	0 " 14 obs'ns.	.502	8.402	8.473	8.828	8.567
October........	4.29	13.51	3.59	7.13	30.1	30.236	30.261	30.202	30.228	30.231	.55	.876	.649	.889	.804	.650	0 " 9 obs'ns.	.350	5.761	5.870	6.530	6.053
November.......	2.77	9.95	3.52	5.41	20.0	30.331	30.355	30.293	30.337	30.329	.32	.921	.726	.893	.846	.480	0 " 8 obs'ns.	.520	5.842	6.069	6.266	6.059
December.......	4.19	8.71	5.16	6.02	17.3	29.969	30.067	29.976	30.141	30.033	.91	.882	.745	.844	.823	.463	0 " 14 obs'ns.	.537	3.626	4.230	4.167	4.007
Total averages..	2.23	11.57	3.31	5.70	21.97	30.225	30.261	30.210	30.256	30.224	2.28	.929	.694	.896	.859	.514	.16½	.485	6.546	6.599	7.147	6.724
Annual averages	21.97					30.224						.859							6.724			

* I am indebted to Prof Forsbey for this column; it was made at Carrollton, eight miles above the city; and is the average of nearly three years preceding April, 1853.

[TABLE O.]

Meteoralogy of New Orleans, for the year 1853.

MONTHS.	RADIATION; SOLAR AND TERRESTRIAL.					ASPECT OF SKY; or amount of Clearnesss in Tenths.					WINDS;—THEIR DIRECTION AND FORCE.																		Am't. of Rain.	Periods of Rain. During	
	Average at Sun Rise.	Average at 9, A. M.	Average at 12, M.	Average at 3, P. M.	Average at 9, P. M.	Average at Sun Rise.	Average at 9, A. M.	Average at Midday.	Average at 9, P. M.	Monthly Average	North.	Force.	Northeast.	Force.	East.	Force.	Southeast.	Force.	South.	Force.	Southwest.	Force.	West.	Force.	Northwest.	Force.	Average Force.	Calm.	In inches and fractions.	Days	Nights
January, - - - -	.71	23.83	32.71	26.15	1.23	5.32	5.16	5.70	7.74	5.98	14¼	1.91	3¾	1.80	3½	1.78	1¼	2.40	0½	1.50	1.	2.	2.	1.50	4⅓	2.61	1.93	0¼	3.190	4	4
February, - - -	.65	23.40	34.72	20.10	.84	3.28	4.71	3.10	6.46	4.38	4½	1.94	3.0	2.0	3½	2.0	5¼	1.95	4	2.37	3⅓	2.38	2.	1.62	2⅓	2.88	2.14		4.600	5	4
March, - - - - - -	1.13	25.57	26.00	16.80	1.17	5.06	4.12	3.83	5.38	4.59	9½	1.97	4½	2.0	3.0	2.08	5.0	1.99	4½	2.16	3.	2.08	1.	2.0	1½	2.33	2.06	0½	6.870	8	4
April, - - - - -	.90	22.52	18.87	17.14	1.17	5.03	5.43	5.93	8.93	6.33	3¾	1.46	2¾	1.90	3.0	1.35	5.0	2.15	7¾	1.46	2⅔	1.53	2¼	1.55	1¾	2.42	1.77	1.	1.848	2	1
May, - - - - - - -	.90	21.18	16.96	21.65	.72	7.22	7.12	4.77	9.06	7.04	6.0	1.75	2½	2.10	5¾	1.86	4¾	2.26	5¾	2.08	2¼	2.00	1¾	1.28	1.	1.75	1.88	1.	3.840	5	0
June, - - - - - -	.83	23.15	18.28	20.89	1.66	7.44	6.86	4.63	8.36	6.82	0¾	2.00	8¼	2.00	7.0	1.92	7.0	1.60	2½	1.80	1½	1.66	1⅓	1.00	1¼	1.80	1.72	2.	1.757	11	2
July, - - - - - - -	0.30	25.0	25.15	26.78	1.67	3.81	3.43	2.54	6.80	4.14	0¾	2.33	1¼	1.20	1¼	1.60	1½	1.00	3¼	1.69	6.	1.83	2¼	1.33	1½	1.66	1.58	6½	11.708	18	4
August, - - - -	.30	25.43	34.27	29.30	.63	7.55	5.62	5.46	7.0	6.34	2¼	1.33	4½	2.11	9.0	1.88	1½	1.55	0¾	1.33	0.	0.00	5.	1.20	1.	1.75	1.33	17.	7.016	11	0
September, - - -	.64	25.70	25.78	27.79	2.12	5.70	5.63	3.93	7.56	5.76	4¼	2.82	5.0	2.05	12¾	1.86	2¾	1.66	0.	0.00	0¾	1.33	1¾	1.28	0¼	2.00	1.62	3.	5.045	14	3
October, - - - -	.39	22.04	24.83	24.06	.53	5.51	5.80	5.22	7.61	6.03	10	1.97	6.0	2.54	9¾	1.89	0¼	2.06	0.	0.	0.	0.	1½	1.33	1⅓	2.60	1.54	1½	5.175	3	3
November, - - -	1.13	14.48	19.49	11.99	6.36	4.73	5.23	5.96	7.03	5.73	4⅔	2.21	5	2.30	9½	1.82	3	2.08	0¼	1.00	0¼	1.00	0½	1.00	2½	2.11	1.69	2¼	7.032	6	3
December, - - -	3.20	10.95	17.20	12.25	4.57	5.21	4.68	4.54	7.00	5.35	6⅔	2.55	2¼	1.92	6	1.83	0½	2.50	1¼	1.60	0½	3.50	2.	1.87	4⅔	2.05	2.21	2¼	4.560	7	4
Averages, - - -	.92	22.27	24.52	21.24	1.88	5.48	5.31	4.63	7.41	5.70	67	2.02	48¾	1.99	63	1.82	37¼	1.92	30¼	1.41	21¼	1.52	23¾	1.44	23½	2.16	1.78	37¼	62.641	94	32
Average Means,	5.90					5.70																					1.23				

The "ASPECT OF THE SKY" is taken on a scale where 0 represents entire cloudiness, and parts of the sky, clear up to 10, entire clearness; and the FORCE of the Wind, on a scale from 0, representing CALM, up to 6, a violent storm.

SUPPLEMENT.

REPORT READ BEFORE THE ACADEMY OF SCIENCES OF NEW ORLEANS.

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REPORT

READ TO

THE ACADEMY OF SCIENCES, NEW ORLEANS,

IN DEFENCE AND EXPLANATION OF THE

REPORT OF THE LATE SANITARY COMMISSION TO THE CITY COUNCILS,

By E. H. BARTON, M. D., *its late Chairman.*

"*Dies errorem delet, veritatemque illustrat.*"

It was not to be expected that the late Sanitary Commission, in the fulfillment of the important trust confided to it by the Public Councils of the City, would in the investigation and disposal of the various delicate and long disputed questions before the Medical and Scientific public, so finally put them all beyond dispute, as to leave no ground for dissent. The subjects involved in the discussion have long engaged the profession and the public in the mazes of controversy. It did not flatter itself with the expectation that all these were to be settled at once. But it anticipated from the courtesy of the Profession, in view, no less of the magnitude than of the complicated character of the points involved, (being strictly those of a scientific character,) that the discussion of their merits, their value and the new principles evolved, would be temperate, courteous, and strictly confined to the subjects at issue. In this, it has the honor to acknowledge, it has not been disappointed, and that, with one single exception, the Report has met, throughout the whole Union, with a kindness of reception unsurpassed in literary annals. If there there has been any departure from the unanimity which has characterized its reception elsewhere, it is upon points where greater detail and illustration were deemed necessary in the Report itself, and we gladly avail ourselves of the opportunity, to make farther explanation; to fortify points not deemed sufficiently explicit, and to prove, by analogy, what is insusceptible of any other testimony. In pursuance of this intention we shall proceed to examine a paper addressed to the Legislature by our friend Dr. McFarlane—professedly on "Quarantine."

In analyzing this criticism on our Report, (for the greater part of it is no less,) we willingly confess, that the Doctor occupies a very different position from that alluded to above. He is a gentleman of education, and we cheerfully admit he has fine acquirements, and gifted with a most exuberant fancy, and although endowed with some extraordinarily queer notions, has that churacteristic of genius, which makes the worse appear the better reason. In the examination of this remarkable paper, it becomes our duty to say, that he is in the constant habit of supplying a most defective memory, with a most fertile imagination; fancy supplies the place of facts, and the sober and unsuspecting reader is fairly fascinated and carried away by the exuberance of its creation. But neither science nor truth requires such lofty flights, and we shall find it proper to clip the wings that soar beyond their sober dictates, and test their value by the humbler and rather vulgar standard of reality. The only trouble this examination has cost us, has been to saparate fact from fancy—to distinguish the true from the assumed, and to show that assertion is not proof. Archimedes said that "if he had a place to stand on he could move the world"—so with this gentleman—admit his data and his positions are proved. Now, this task of separation has not been an easy one, simply because, with his pruriency of imagination, he has winged his flight over periods where there exists a great deficiency of records. To be sure, it was much easier to deny the verity of his assertions at once—to meet them by assertions in turn, and call upon him for proof, which we knew did not exist. This might answer very well in a court of justice—but in a discussion before the public would be little heeded.

This gentleman has informed us that he "is the oldest member of the Profession here." Now age has its attributes as well as its privileges. From age should spring wisdom—the fruit of long and enlightened observation. But one of the sorest attributes of age, is a defective memory and inappreciation of recent discoveries in science. If, then, in the course of these observations, I shall have to point out a very remarkable failing here, he has furnished a ready excuse in the patriarchal age he boasts of. But age cannot sanction errors, and time, which writes its furrows on the brow, does not always purify the mental vision. Age and opportunities of knowlege are legitimately to be boasted of, when the evidence of their right use can be pointed out, through successful industry, exploring the mysteries of our science and in trophies which have benefitted mankind. These—these are the true triumphs of wisdom. They are putting to their proper use, the splendid education spoken of, and the fine talents we know he possesses. We shall not follow the example he has set us, but leave our cotemporaries to say, if the course we have pursued, in investigating the *causes* of phenomena whose effects have been so disastrous, as to enable us to understand and *prevent* them, is not making a better use of education and the humble talents we possess, and is not being more useful to mankind, and leaving more enduring monuments behind us, than all the corruscations of genius and all the brilliancy of a meteoric blaze.

It will become necessary, in defending our Report, to expose these errors of fact as well as errors of reasoning. If the gentleman has departed from "the established doctrines of the medical profession and of the whole civilized world," as he boastingly acknowledges, and wantonly sacrificed them for those whose tendency is to keep this country in a *statu quo*, forbidding all hope of amendment hereafter; we, nevertheless, give him credit for good intentions, because we have long known intimately the source whence they emanate. But the consequences resulting, are no less to be deeply deplored, for, if carried out, *as they have been practically carried out here for many years*, they are fraught with vast injury to the city, which we are equally sure he does not see, as they are accompanied with no recommendation for alteration or amendment—thus leaving us nothing but lamentations for the past, and without hope for the future! It was feelings very different from these which gave birth to the Sanitary Commission. This city, with no equal on earth for commercial purposes, has been staggering and struggling under a wretched reputation for insalubrity for many years, which, if it could be removed, as we are very sure it can, her unequalled resources would be at once developed; it was with the full conviction that there was something radically wrong in the constant succession of devastating epidemics—notwithstanding all the "Buncombe" writings and assurances to the contrary, which first gave birth to this investigation into its causes. It would then have been false to their honorable appointment, false to their noble profession, and above all, false to the community which had looked to them for sound advice, and an intelligence, corresponding in some degree, to the enlightened advancement of the age we live in, did we not repudiate all such heterodox notions—notions not having their basis in common experience, are unsupported, we firmly believe, by all we know of man's nature.

The course pursued by our city authorities, for a great many years, has been empirical in the extreme—never to acknowledge that there was any need for the cauterizing hand of surgery or science, in the face of an annual mortality exceeding that of the most celebrated battles, and in a ratio more than double that of any large city in America. This disastrous course must be mainly attributed to those who, assuming the credit of having examined the subject, have been instrumental in forming a public opinion, whose effects we all see around us. These have asserted that New Orleans is "one of the healthiest cities in the Union," which was proved by an array of testimonies from various travelers as far back as a century ago! and farther corroborated by deriving the average age at death by selecting it from epitaphs on tombstones! these *irrefragible proofs* have been constantly dinned into the public ear, until finally, it has become a kind of moral treason to admit that people die here at all! and all who attempt to stem this torrent of lies and toadyism, are held up as enemies of the city—as attempting to "write down" New Orleans. And even if one dares to tell the truth in a public document,* we are accused of saying things "least flattering to New Orleans."

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* Board of Health Report, 1849.

And, really, one must have some moral courage, in the face of a public opinion thus artificially formed, to dare to tell the unvarnished truth. And what is that truth ? a mortality of near six per cent., for near half a century, instead of their " unparalleled salubrity ! !" and an occurrence of ten epidemics of Yellow Fever and Cholera in eight years, with a mortality of 77,338 during that time, or, near half the present population of the city—officially published ! To show that this is but the necessary and inevitable result of the circumstances around us—these very precise conditions have existed and produced these very results under analogous climates and conditions, wherever they have existed, and that in proportion to the cause so have been the effect, in the most unvarying manner ! When pinned to the wall to account for this frightful mortality occurring year after year, the impudent and ungrateful reply is—" it only consists of immigrants !" immigrants who have made this city what it is, and consists now of no less than two-thirds of the white population. Is it not time that this audacious and miserable system of public imposition should cease, when the reputation of the country is ruined, the hand of improvement palsied, and we are losing some of the best of our citizens by emigration ? Is it not time that this veil of concealment and falsehood should be withdrawn—and that we should look the facts steadily in the face ? Is it not time that the truth should be told in all its naked deformity—if we ever intend making an attempt at amelioration or change ? Indeed the sanitary condition of New Orleans is not, at this day *a matter of opinion*, with the mortuary returns and the census of the population before us, for half a century or more ; it has, unfortunately for us, passed from opinion *to fact*, about which there is no room for dispute by any honest inquirer. The data are not contested and are incontestible. With the variation of these causes so has varied the disease. Can proof be stronger ? It would really seem from all the facts, the testimony and the reasoning, that all well constituted minds would come to the same conclusion, where the weakness—where the imperfection of the argument and conclusion is, I confess, I am utterly unable to see ; and it is certainly a poor compliment to the intelligence of this people to attempt to humbug them in this way. The people of New Orleans in matters to which they have directed their special attention, have no superiors in shrewdness and sagacity. Upon the subject of the public health, they, like most others, will readily submit to be flattered. The time has come, however, "to speak the truth, the whole truth and nothing but the truth." No city on earth, notwithstanding its great commercial advantages, can long sustain such drains as we have undergone. It must cease, or there is no help for New Orleans. There has been no attempt at denial of our facts, and we are very sure our conclusions are irrefutable.

In relation to the present paper—data are assumed—hypothetical views set forth, and untenable objections to our positions, which I now proceed to examine.

The following quotation embraces these unique views and objections, and I give them in extenso in order to do their author full justice.

[It was here intended to give three-fourths of the entire paper of Dr. McFarlane, to comply with the last remark—but as, wherever objection is made, the objectionable part is quoted, it was deemed superfluous.]

Let us test these averments by the rule he has himself laid down, viz.: "*That medical philosophy in order to be useful must be accurate.*" "During 1825 there were not twenty days in which it did not rain violently throughout the whole year!" This, of course, is all *ad captandum*, as there is *no record of rain* falling in New Orleans at that period, and it is just as easy to say it fell every three days; and be it remembered, that all this is from memory, a memory extending back beyond the average age of life here! But there is a mode of arriving at the *probabilities* upon this subject, which, although it has cost me some labor, is not without its value, in various relations to this subject. Failing in records, which I am convinced, after much research, do not exist, I have accurately calculated every record of rain that I have been able to ascertain has been made in the delta of the Mississippi for the last forty years. From these calculations I have learned three valuable facts:

1st. That a very rainy season in one part of the delta is very apt to exist over the whole.* 2d. That an unusually rainy and sickly season are commonly concomitant; and 3d. That less rain falls in New Orleans than any part of the State, (by near 19.48 per cent.) so far as any records have been made, and these records have extended from the low lands of Placquemines to the high grounds of Washita! The first is not at all improbable, because the direction of the rain-bearing winds all proceed from the same quarters—that is from the S. E. to S. W., (the Gulf of Mexico and submerged delta.) Of the second, I have before spoken in the Report, and the result of this examination still farther corroborates it. Well, then, I have the record of the year 1825 and the following years, made by myself, in this State near the Mississippi river, between 30 and 40 miles farther north than New Orleans, and the record of that very year shows *fourteen inches less of precipitation occurred than the average of* 13 *years*, and the average of the three following years were almost equally small—they were all comparatively healthy years in New Orleans, as we see by the Cemetery returns, and the strong presumption is were comparatively dry years. The year following this series (that of 1829) was one of the greatest precipitation in that record, it was a year of a severe epidemic in New Orleans, and by a like probability, a very wet year. A large amount of rain fell in the winter and spring months, in the position referred to, (in 1825) and it is probable the same occurred here—nor does it require a great deal of rain, on the much used unpaved soil of the streets of New Orleans to produce deep muddy holes.

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* The great value of this information to the commercial as well as agricultural interests of the State, will be readily understood by intelligent men. I have not been called on, from the course of my argument, to extend my researches into neighboring States. But its direct bearing upon the productions of our cotton bearing States, as well as others, is obvious enough, and is eminently entitled to the regularity of national record, to be published monthly, from every parish and county in the South; and it might be made the duty of the principals of the Public Schools to do so, from instruments furnished by the State.

Nor is New Orleans actually warmer now than it was 30 to 40 years ago, notwithstanding "the slate roofs and brick houses and pavements." On the contrary, and on this subject I can speak with the record before me—*it is actually cooler*, from 2 to 3 degrees on the annual average, probably arising from the more extensive clearing and draining in the neighborhood, admitting a freer ventilation, and the extension of these very brick houses complained of, which are much cooler than wooden ones.

So, also, yellow fever has been found remarkably fatal with "rag pickers, scavengers, grave-diggers, and those who dig in the streets," unless when they consist of acclimated subjects.

Again, to show that yellow fever is neither more frequent nor virulent now than formerly, I have constructed the following table, embracing all the epidemics since 1816—when the ravages of the disease began to be more definitely recorded, and divided them into four periods, *viz.:*

	Average mortality per 1000.	Average duration of epidemic influence
The first embracing the short period of 6 years, containing the four epidemics of 1817, '19, '20, and '22..........	20 30-100	77½ days.
2d. Embracing next 11 years, containing the three epidemics of 1829, '32, and '33..........	14 62-100	40 "
3d. Extending to '42—9 nine years, including the three epidemics of '37, '39 and '41..........	12 25-100	56⅔ "
4th. Extending to the present period—12 years, and including the five epidemics of 1847, '48, '49, '53 and '54..........	20 62-100	55 "

But let us proceed farther in testing the *accuracy* of the averment—"that there did not occur a case of yellow fever in New Orleans for six years afterwards"—that is, after and including 1825. The published returns of the Charity Hospital alone exhibits a record of 1344 cases during that very period! and that house usually furnishes from one-fourth to one-third of the mortality of the city. Comment is unnecessary.

But, let us proceed—the term "virginal soil" was not used by the Reporter, "*original soil*" was. The soil, as deposited by the river on its *banks*, is known to contain very little organic matter, and the simple disturbance of that soil alone, it is not believed, or *ever stated*, would produce the influence ascribed to the "terrene." What is specially denominated and comprehended under this term was distinctly stated to be the rich alluvion of the country—the marsh mud—the detritus and remains of vegetable and animal life, and to be equivalent to putrifiable substances of all kinds, the filth of kitchens, stables, vacheries, privies, and every species of filth and offal—the relics of civilized life—from whence proceeds the bad air produced by this disturbance and decomposition. These are found mostly in our back yards, in the gutters, streets, open lots, and are especially conspicuous where our pavements are disturbed, (for the pebble-stone pavement is eminently objectionable in being the *best filterers and retainers* of putrescent organic matter.) The "disturbance" of these is always very offensive in hot humid weather, (the meteorological condition) and injurious to health. So the detritus and filth of our canals and basins, when dug out or cleansed, are composed, mainly, of these same materials, also the deep cuttings and excavations for our railroads, the *first cultivation* of the soil for agricultural purposes; all are followed by sickness *when the meteorological condition is present* and of sufficient duration. These results are believed to be uniform, the proofs are positive, the facts are not denied. They are evaded by a side issue, which will be examined presently. It was never said, meant or pretended, that cutting through a *sand* or *clay bank* would produce these effects. Now, *precisely analagous to this* was the composition of the "mud of Camp and Magazine streets, and those *impassable* gulfs of 6 or 8 feet deep, in which hundreds of horses perished in 1825!" These are not offensive to smell, have not much organic matter in them, and are but little injurious to health, except from the humidity they promote, in an unfavorable season. The streets of New Orleans, from Levee to Rampart streets, were composed, originally, mostly of river mud, and afterwards covered with our wretched pavement, and it has never been asserted anywhere by us, that *that mud*, however "disturbed," would produce disease. But take up any of our ill constructed pavements in the moist summer season, and particularly of the gutters, wherein is deposited and retained most of the filth, and the nose, even at a respectful distance, will detect the difference between the materials filtered beneath them, and common mud. It was for this reason the Sanitary Commission advised the construction of pavements that would neither admit absorption or exhalation. What was asserted is expressed above, and defiance of any exception to the rule, as laid down, is offered. Since the publication of that Report, public attention has been called to the subject—numerous instances have come to light, strongly corroborative of that important truth, and none to oppose it.

The organic poisonous matter, then, is satisfactorily accounted for, without the necessity of looking for it in the "argillaceous deposit," and thus furnishes "one of the blades of the shears of fate."

But it is said—"there being a declivity of 10 or 12 feet from the elevation of the levee to the swamp, one deluging rain is at any time enough to remove all superincumbent filth, and convey it to the swamp in the rear of the city." The folly of this is made apparent, when it is known that *no surface washing* will remove that which is *beneath the surface*, and after a few hours of the "most deluging rain," filthy bubbles of the most corrupting materials, may be seen, during every sickly season (that is when the meterological condition is present) arising from the subsoil and imperfect pavements, where some little water is left. But, again, I wish my friend to be brought down from his lofty imaginings; this beautiful inclined plain of "10 or 12 feet from the *elevation of the levee* to the swamp," turns out to be, that from Levee street (not the top of the levee) to Rampart street, is about six feet, and the balance about two, in as many miles. But in the whole of this course, subject to every kind of obstructions and retardations, so that a rain, say a sudden one of one inch in vertical depth falling in an hour, (a very unusual occurrence) is positively hours in reaching the swamp, and all, who reflect for a moment, are aware of this fact, for in the central portions of the city, where the greatest declivity or inclination occurs, and where the pavements are most extensive, there exists, in fact, comparatively but few obstructions, except bridges, and we all know that it is often hours before we can pass the streets, (after such a rain as above) which then are converted into almost impassable canals and miniature rivers. How much much more so is it beyond Rampart street, where this "inclined plain" has more than four times the length, with about one-third of the declivity, and hence the necessity of deeper gutters to carry off the water and filth, onward to the swamp.

"The results of investigations made in this and corresponding regions make it manifest that wherever *heat*, *filth*, *moisture*, *decomposition*, *exhalation and malaria are combined in sufficient concentration to produce disease*, there yellow fever cannot exist!!!" The italics are his own. All this is truly "the antipodes of the doctrines of the Sanitary Commission," as "IT IS OF ALL THE WORLD." The capitals are mine. The result of investigation!!! why, it is exactly the reverse. The records of the dead—the records of the Profession—the history of every sickly place and country—the experience of all mankind, all accord in *an unanimity*, *no where surpassed*, that filth (in the enlarged sense) produces disease everywhere, and particularly in a warm and humid climate and season. So intimately is cleanliness associated with our ideas of health, that it has become one of the strongest instincts implanted in our nature, corroborated by divine revelation, and participated in, as a strong conservative power, by the lower animals, even at the earliest age, and man estimates and cherishes this, just in proportion to his elevation in the rank of civilization and intelligence. The causes producing it are known to be at war with his being—they consist, mainly, of effete worn out matter, of organic materials, passing from one stage of life where, in the order of Providence, they have performed the task assigned them, and fulfilled the circle of all created things, and are no longer fitted to perform this duty a second time, until their allotted round is past. The Report is most conclusive upon this subject—the facts upon which it is based are *undenied* and *undeniable.* It is there conclusively demonstrated, that filth does produce fever, and with the *meteorological adjunct*, YELLOW FEVER; that in the parts of cities where these are most concentrated, are its peculiar haunts; that these effects are in *pretty precise proportion*, both in numbers and malignity, to the predominance of the aggravated causation—and the very places, spots and houses have been designated, and not satisfied merely with a reference to other distant cities, places and periods, they are pointed out *here*, *under our very noses and eyes*—the *witnesses are all before us*—the *testimony is direct*—the *facts irrefragible*—they are undeniable; but now, forsooth, to gratify a whim, our friend has exhumed a most fanciful hypothesis from its sleep of centuries, where it never was exalted to any higher dignity than "the on dits of *travellers*." But, seriatim, let us see upon what grounds it is now hazarded. Let us examine that "demonstration which is as clear as any proposition in Euclid."

The first proposition is, that "where malaria is sufficiently concentrated to produce disease, *there yellow fever cannot exist.*"

This has been most thoroughly answered in the preceding paragraph —not occurring where there could be any room for doubt—but before us all, where the real difficulty consists in avoiding to see it; where exists the festering sores of the city's filth is found the city's mortality; where year after year are offered up the catacombs of those valuable laborers, who constitute our real wealth, to the insatiate archer, and in lines of lurid light illumine the dark holes and sinks where the innocent victims of erroneous opinions and erroneous action, or want of action, could read a lesson to make humanity shudder, calling aloud for the cauterizing hand of reform, ruining the reputation of the city and blighting her commercial prosperity. But the subject is not left here; it is shown, by the most unexceptionable authorities, living and dead, with a like exactitude of time, place, and circumstances—nay, by testimony only limited by historic records, and confirmed by all reasoning from effects to causes, and vice versa—that these effects exist *wherever* these causes do, and that in proportion as they are removed, or gotten rid of, or cease, so subsides or ends the effects. Let us examine the *argument* furnished for its support, in place of and in substitute for *facts*, which are directly opposed to it.

"Yellow fever is different from bilious or miasmatic fever; this, in its progress and phenomena, is accompanied with visceral engorgement and frequent returns, which is not the case with yellow fever, and that, *therefore*, 'whenever miasmatic fevers exist, yellow fever never occurs.'" The most casual examination of any cemetery return in this city, and particularly that of 1853 and accompanying map, will most fully answer this statement. And what do these silent, but most unanswerable records show? They show, and the demonstration is before our eyes, that in this very city, during the worst seasons and the hottest and moistest months, the filthiest localities are reeking with yellow fever, while the balance of the class (for as I class them all together as proceeding from the same cause, but in a minor degree) of miasmatic fevers—as intermittent, remittent, bilious, congestive and pernicious fevers, prevail at the same time and place, as well as at other periods. The following table, derived directly from our cemetery returns, presents the simultaneous prevalence here of both, in separate columns. A very cursory examination of this table will fully satisfy the honest inquiry after truth, that the same fevers do occur in the same city and locality; the susceptibility of the subject, and the filth, etc., of their habitations constituting the only difference between them.

Relative frequency and cotemporaneous occurrence of Yellow Fever and other Miasmatic Fevers. Derived from the Official Cemetery returns.

Year.	Disease.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	Decembsr.	Total.
1853	Yellow fever	1				2	31	1521	5133	982	147	28	4	7849
	Other miasm'c forms, as remittent, intermittent bilious, conges., per's, typhoid fevers.	40	23	20	36	39	55	94	90	89	31	18	25	560
1852	Yellow fever.............								10	68	221	no	ac't	299
	Miasmatic fevers.........	48	64	63	49	38	78	105	78	109	109	no	ac't	741
1851	Yellow fever.............								*7	*4		1		12
	Miasmatic fevers.........	51	60	*44	†39	63	‡11	*35	*59	*76	*62	61	‡35	596
1850	Yellow fever.............	1		2		1			4	62	33			103
	Miasmatic fevers.........	56	37	39	28	26	32	32	68	205	144	42	43	752
1849	Yellow fever.............							1	17	214	416	112	9	769
	Miasmatic fevers.........	40	33	62	39	48	47	44	93	70	62	43	42	593

* One week missing. † Two weeks missing. ‡ Three weeks missing.

The following memorandum was extracted from Dr. Fenner's Southern Reports, and was derived from the cases occurring at the Charity Hospital, and is further corroborative of the same.

1849.	Yellow fever.............							2	28	374	520	130	6	1066
	Intermittent fever.........	109	114	138	117	69	155	368	592	763	720	360	684	4439
	Typhus, typhoid, Remittent, bilious continuous.	91	143	225	163	164	180	160	191	285	142	101	115	1910

Thus, in precise accordance with these principles, in parts of the country where prevails the less severe forms of these fevers, the causes do not exist in such an aggravated degree as in low grounds, the estuaries of rivers, the outskirts of cities; but where they exist in an eminent degree, in hot, humid weather, in parts of cities where there is concentrated the most filth, in dark, unventilated alleys, in crowded rooms, where human offal, the worst poison of man, is accumulated, and where the habits correspond, here exists the most malignant forms of fever. These *very spots* are the birth-places and abiding homes of YELLOW FEVER; everybody, who will take the trouble, may see it in these places every year; they are the very places which give birth and prevalence to it in all cities liable to this form of fever. They have been specially pointed out in the report.

Why these effects should not always *ensue at once* from exposure to these conditions, is no more known than why some people never take the fever at all, nor than having had certain diseases once, we are no more subject to them. But we do know that TIME is an important element in the causation of disease, and that susceptibility varies with the physiological condition But who shall say we shall never know them in an investigating age? who shall set limits to the progress of knowledge? only those who never take the trouble sincerely to inquire.

Again, precisely the same exhibit is made in relation to Charleston and Savannah, as their records, now before me, abundantly prove. Whenever a cause exists to aggravate the sanitary condition of either of these places, yellow fever occurs. Accordingly, the draining, paving, and other sanitary reforms in Charleston, have made that one of the healthiest of American cities, subject to occasional epidemics, during very remarkable seasons, from some hygenic remissness. The aggravations in relation to Savannah, since the great improvement in her health, from the adoption of the dry culture instead of the wet, for rice, have been owing to special causes—some of which have been pointed out. Savannah, although having some cases of yellow fever every year, has particularly suffered from three very fatal epidemics, *viz.:* that of 1817, '20 and '53—during these the additional malignity (certainly during two if not three of these occasions) were imparted to the disease, by cutting down and leveling the streets, spreading the refuse and offal of the yards and kitchens on the streets, and otherwise disturbing the soil by digging trenches for gas and water-pipes, and filling up squares and lots with fresh earth.

Egypt — the Campagna or Pontine marshes — Walcheren and Chagres, have each their peculiarities, but afford no argument in exception to the principles laid down, as I proceed to show.

The causes of the diversity of the types of diseases of different climates, medical investigation has not yet fully developed. Of that large class denominated fevers—the main outlet of human life—varying in the estimate of eminent men, from one-fourth to two-thirds—the mystery may be more nearly solved than is now generally imagined. The Plague in the East, the Yellow Fever in the West, and the Typhus Gravior in England, are, by *general consent*, at the head of their respective classes, in these several great ranges of country. These climates differ essentially, not more in their temperatures than in their hygrometric properties, and in the mode of living of their respective populations. The climatic details are too limited in relation to Egypt to apply, fully, this mode of accounting for the plague, especially there. Two facts are well known in relation to the influence of causes readily arresting it. 1st. It is speedily put a stop to by the prevalence of dry winds from the deser . 2d. It is drowned out by the supervention of the Nile; an instance is mentioned where this was so remarkable, that five hundred less died of the plague, the day after an occurence of this kind, than the day before.

The same principles apply to Walcheren and the Pontine marshes, the insalubrious condition of both derive their controlling influences from their excessive humidity, their temperatures *are known to be too low to produce the development af yellow fever.*

Although it is not entirely true that yellow fever is confined to seaports, as supposed, or places near the sea, yet it is uncommon for it to break out or spread much in the interior—nevertheless, it is well known, and experienced practitioners will bear me out, that sporadic cases do sometimes occur far in the interior, when aggravated conditions of heat, moisture and filth exist in adequate combination to furnish sufficient cause. It is then developed without farther difficulty or need of "seeds," etc. Thus it has occurred at Natchez, Woodville, Bayou Sara, and at other places on the Mississippi, near the gulf, and insulated places far in the interior, where it was absolutely *impossible* for it to have been conveyed or imported, none being in New Orleans at the time, nor as far as we know, within 500 or 800 miles. The very idea of "germs" of it remaining over a season or so, is too ridiculous for argument and only requires to be mentioned to be repudiated by all men of experience. Thus, then, the only prop the contagionists have had, has been knocked from under them, and the true and only explanation has been made upon scientific principles. From all the observations I have been able to make—of the cause of this notable exemption, to the extent it actually does exist, it is clear to my mind, that it arises as much, and probably more, from the difference in the hygrometric properties of the atmosphere, than in differences of temperature, (of course in combination with the terrene.) This can only be proved by accurate experiments, and these have not been made.

It is to be deeply regretted that, at this enlightened day, accurate and extensive experiments have not been made with the hygrometer, thermometer, etc., in direct connection with their important bearing on human health and life. It is nothing new, I know, to attribute the origin and extension of malarious fevers to great heat and moisture, but it has been done in a very indefinite manner, and as often disputed, and no precision has been connected with it, and no principle applied, until of late. Many nave denied this connection, because the precipitation has not been large enough *in their estimation*—being unaware of that worst condition—the hygrometric state of the atmosphere—which they have at the same time unknowingly admitted in the form of mould on leather, furniture, etc. Now, it is not merely gratifying to scientific curiosity to know that this property can be detected with philosophical precision, by instrumental observation, but it is a practical fact, of the utmost value to society, as upon a foundation of a knowledge of a cause of disease alone (and this as one of the most controlling ones particularly) can we build the structure ef prevention. Sanitary laws, then, must have their only rational origin.

In the discussion of the cause of the difference of the types and grades of fever, there is an important omission, which I will embrace this opportunity to supply. Nothing is more common, not only here, but in Mexico, South America, the West Indies, Savannah and Charleston, during sickly seasons, while yellow fever may be prevailing among strangers or the unacclimated, for the natives or acclimated, to be affected with a milder grade of fever, under the same exposures—they are often so similar in type, as to be almost impossible to distinguish between the two. It is the same with the Africans (their first season) when taken to different regions, where the yellow fever may be existing, although the yellow fever proper, hardly exists in Africa, but an equivalent malignant type of fever does, to which they are habituated. This occurs constantly, when approaching in grade, they run into each other, and interchange symptoms, according to susceptibility and treatment. This difference of susceptibility satisfactorily accounts for the diversity of effects in individuals exposed to similar influences, one having a very mild attack and the other one of great ferocity, without its being at all necessary to attribute them to *two distinct* poisons; the *yellow fever in the stranger being equivalent to the milder grade of periodic fever in the native.* It is precisely similar to what occurs in a man accustomed to indulge in ardent spirits or opium, an ordinary quantity or dose, has little or no influence on him, while on one not so habituated, a real toxical effect is experienced.

This difference of susceptibility, also varies in the same individual at different periods and from different causes. We often see a man pass through one or more, nay, through many yellow fever epidemics, in the closest and most intimate intercourse with the sick, and yet with the most perfect immunity, and in a subsequent season fall a victim to it. It is, then, during the existence of an epidemic, the rule of prudence, sedulously to avoid committing any act of imprudence, that can *unbalance* the constitution during its prevalence—such, for instance, as a debauch, a fit of passion, a fall from a horse or carriage, a sudden fright, etc. I knew an instance some years since, where near a dozen young men, who during their first year had escaped the prevailing epidemic to an advanced period of the season, and who determined to celebrate their triumph by a feast, which terminated in a debauch; in the course of a couple of weeks, there was but a single survivor, and he was an invited guest and acclimated.

But there are direct, opposite and beautiful analogies in our profession to prove that the same poison or agent may produce diversified effects on the same individual, that is, act on *different organs*, in different quantities or doses. For instance, a small dose of opium exhilirates, a large one produces cerebral congestion, a small dose of arsenic strengthens and fattens, with a slow undermining of the constitution, a large one kills in a few hours, more or less; a small dose of ipecac or antimony sweats, a large one vomits; chamomile sweats, vomits, or acts as a tonic, dependent upon its mode of administration; and how numerous the influences do we expect from mercury, dependent upon the quantity and mode administered. Fluctuations in the weather, and particularly hygrometric changes, produce catarrh, pleurisy, pneumonia, and sometimes various intestinal-gouty and febrile affections, dependent upon the amount of exposure and individual susceptibility and predisposition. The balmy air which sustains our being, the purling brook which furnishes the pabulum for all animated nature and the deadly poison, have the same atmoic elements, limited in number, but diversified in combination, which produce such different effects. But why multiply examples, which are absolutely numberless, to prove a truism in medicine? Is there any plausible reason why there should be required a difference in the *nature* of a cause productive of fever, while a medicine, merely by a difference in quantity, should have such a diversity of effect? There is certainly none. It is in the one case as in the other, different portions of the organism are assailed *by virtues inherent in the dose*, or amount of poison, and such an interpretation is consistent with all we know in medicine and in nature. This is most aptly illustrated in the mode and rank of the organs on which the pathological influence is displayed, and thus admirably corresponds with the apt analogies just furnished. Thus the one attacks the more vital structures—the citadel of life—the brain, the sanguiferous system—those of cerebral life; the other, the *instruments*, the organs by which the body acts and continues existence, the branches—the outposts, as it were—the liver, spleen, mucous membrane, which by reaction, sympathy and symptoms, interpret the place and character of the attack, and call for treatment *through indications.* In the first, time is not allowed for this effectively; in the second it is; and it is through a long course of actions and reactions of and on the organs, showing the great difference between them.

But there is another proof, well known to medical men, which beautifully illustrates my position, although it has been most unfortunately used as an argument against it. It consists in the liability to attack; in the case of bilious or periodic fever, a second or a third time, or more, in fact, the oftener it is endured, the more liable to its repetition! This arises solely because the *organs* become more and more crippled at each subsequent attack. This is not so in yellow fever, because these organs are rarely embarrassed by the disease. It is the higher range over which it passes, and when the system is not entirely overthrown, recovery is apt to be rapid, thorough and perfect, and a remarkable renovation of the system is often known to result from it.

Let us apply these remarks and illustrations to the subject before us. Yellow fever has been denominated in the report, the highest and most malignant grade of fever known in the Western hemisphere, the proof of which is, that its mortality is much greater; so deadly are its attacks at times, that the patient succumbs in a few hours; sometimes the first symptom is the fatal black-vomit; hæmorrhages occur from all the mucous surfaces; at an early period the fatal look is exhibited, and the patient is walking about *actually dying;* there is not a pain or a symptom, (properly so called,) the sympathies connecting the system are dissolved, the fatal blow has been struck at the centre of being, and man's majestic structure is in ruins. Now, this worst form of febrile disease occurs precisely in the seasons and places, where in the concurrence of all experience and reasoning from data thus furnished, we should a priori expect it to occur, *viz.:* in the filthiest cities, where the least attention is paid to sanitary police, and in those very spots, places, houses and alleys of those cities, which are filthiest, most crowded, and the inmates of the worst habits; and it occurs just in those seasons and parts of seasons, when these effects are most calculated to have their worst influence on the human body, *viz.:* in the hottest and moistest seasons; and if there is any want of uniformity in these outbreaks of yellow fever occurring where all these filthy materials are present, it solely arises because the other constituent, (the second blade of the shears,) the meterological condition, which is either absent or defective. Here, then, is the combination necessary to render effective the poison productive of the *highest grade* of fever—*yellow fever.* On the contrary, the other forms of miasmatic and periodic fevers occur, when these execesses do not take place, in the same exaggerated degree. It is then the causes (or poison, if you will,) being in less force, the minor organs and instruments of life become assailed, and symptoms, which are their interpreters, direct to the local action and attack; now we see the liver, the spleen, the gastro-intestinal mucous membrane, the system of organic life, to bear the onus; time is allowed for reaction, and the struggle is made by the system to resist the disorganizing tendency on the special organ. The "Chagres fever," the jungle fevers of India, the bilious and marsh fevers of our own country, satisfactorily illustrate the action of all these secondary influences, and all most strikingly show the analogy between the causation of different classes of fevers with the effects before pointed out, and the influences of medicines on the system just stated. Can demonstration be clearer?

A high dew-point (may be, with other aid) will produce bilious fever, by acting on the materials of the blood and the secretions, and thus on the *instruments* of life; but for this latter (yellow fever) it requires a concentration of these agencies with others, to give intensity, and thus as we have different effects with medicines, according to their dose, so it is with these agents, and yellow fever is the result. This is not mere speculation, nor does it depend upon analogy alone, but it has every presumption in its favor, from the actual occurrence of the disease (yellow fever) under circumstances where this exaggerated condition alone exists. Can stronger proof be required?

It is easier to account for the difference in the types of fever on the thermometrical or latitudinal than on the longitudinal scale. All medical history informs us of the geographical limits of fevers, that where the temperature is high or long continued, with a great amount of moisture, they increase in malignity, (other things being equal,) as these diminish, they lose their severe type or grade, until they finally cease as we approach the arctic or antarctic poles; and not only fevers, but disease almost disappears, and navigators visit, remain months and years, and return from those regions without scarcely losing a man. But it is more difficult to say *why* yellow fever should be at the head of its class in the West and plague in the East. There are climatic and hygienic peculiarities that are still unexplored by which it may be explained, provided we seek for them in the true spirit of philosophic research, and experiment perseveringly with the means science now furnishes her votaries.

In relation to our great Western disease, yellow fever, early history has not furnished us with many more valuable facts, as to its *causation*, than it has of the plague. If yellow fever is an American disease, it was not found here on the discovery of the country, it was only *developed as a climatic influence on European constitutions;* it was only after these Western regions were occupied for more than a century, that it began to prevail; when the settlements became more or less dense, and men congregated in cities, population became crowded, the habits of colder regions were transplanted where they were so unsuitable, and tropical hygiene not understood, that it had its birth.

But science has dawned in the West in the awaking of the mind due to a new era: the spirit of the age now expects to know the *cause* of every thing, secondary agencies are the hand-maids, the interpreters of the will of Deity; it is only upon this foundation can the *true principles of prevention* (or sanitary laws) be based. It is a law to which all that is dear to man is subject, that as there is no fixed, stationary position for man or for science, the moment we stop advancing we are retrogressing. Let us, then, fully advised, use all the means which science, still in her infancy, has amply supplied her votaries, and interrogate nature with the honest and sincere desire to arrive at the truth, instead of speculating with a prurient imagination upon the half-stated and the false facts with which imperfect tradition furnishes us, and we shall thus sooner unravel the mysteries which environ this hitherto dark subject.

Scientific investigation has furnished us valuable data to begin with. I have just stated why yellow fever never occurs in the Pontine marshes, and was unknown in all the ravages at Walcheren, the average temperature being under 80 degrees, below which, it is now known, yellow fever cannot originate. It has been shown that a summer temperature of 60 degrees is necessary for the production of *fever*, and that it never appears as an epidemic, unless the temperature reaches 65 degrees. These temperatures are reached at Walcheren and the Pontine marshes, but not 80 degrees, and for the existence of yellow fever, *this temperature* must not only be reached but *endured weeks if not months.* So precise has science now extended its investigations, but we trust, it is only at the threshold. We now know why yellow fever would not spread in Charleston* when carried there in May and October last, and why, being taken to Aiken and Columbia,† at a more advanced period of the summer, it would not spread either, and that when taken to Blackville and Augusta,‡ it did spread. In the first cases there was a deficiency of heat and humidity, etc., while in the latter they existed. The condition of Augusta has been noted in the "Introduction" to the Report, that of Blackville is low, with a pond in its midst imperfectly filled, swamps surround it, and the irregularities of the ground have been filled up with offensive putrifiable materials. Of the various occurrences of the many "spontaneous cases," mentioned with such emphasis in the Report—in tho absence of precese observations with the thermometer, there are other proofs mentioned. of the existence of, at least, these two agents, as well as others, and I refer, as ample proof of it, to the many "spontaneous cases" of the fever mentioned in the Sanitary Report.

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* Temperature too low.

† Temperature and hygrometer too low, and particularly the latter, and the places clean.

‡ Temperature and hygrometer very high, with abundant filth, etc.

And, again, I repeat the fact, which defies contradiction, that when the temperature and humidity are lowered to a certain degree, (stated) yellow fever, as *an epidemic* ceases in this latitude. These are, I believe, irrefutable truths, constituting the laws of the disease. Another is no less certain, that without the concurrence of the TWO AGENCIES mentioned in the Report—no yellow fever has ever occurred, nor, by sequence, ever can occur! No *amount* of *heat* and *moisture alone* has *ever or can ever produce it.* No amount of *filth alone*, *can effect it;* when concentrated, it may produce asphyxia and death;—when less, with defective ventilation, crowding and a low temperature, it may produce the worst forms of typhus and other fevers, but *never yellow fever.*

I have said that TWO CONDITIONS are required to coalesce or combine, in order to produce the alleged effect—the meteorological and the terrene—and that this latter consists of filth or decomposable organic matter of all kinds—of which I consider fresh rich original soil to be an equivalent. I have never said or believed that one alone was sufficient—yet against ONE ALONE has all the force of opposition been expended!

We think, then, that the following propositions have been clearly demonstrated, from the facts, by experimental observation and by every principle of fair analogy, *viz.:*

1st. That ordinary mud—consisting of the clay and sand deposit of the River Mississippi—is different from the "original soil" referred to in the Report, in this, that one has organic matter in it, and the other has not, and that it is farther mixed with every species of decomposition, and particularly, with the offals of society; that personal excreta, of all kinds, constitute the worst forms of organic matter; that yellow fever results from these, in combination with the meteorological ingredient, and that hence, it is the highest form of fever, and occurs mostly where these exist, in greatest excess, as in the filthiest parts of crowded cities.

2d. That yellow and bilious fevers proceed from the same causes, although differing in degree and amount.

3d. That these causes, acting upon individuals of different susceptibilities, (as the acclimated or native and the acclimated,) produce these different effects — in the first, developing a milder grade of periodic fever, and in the second, the aggravated form, or yellow fever.

4th. That the main pathological cause of the difference in the phenomena exhibited in yellow fever from bilious fever, arises from the difference in the rank and importance of the organs attacked in each case respectively—in the first it is on organs whose integrity is more immediately essential to life, as the nervous and sanguiferous systems, or those of cerebral life; and in the second developing its influence on subsidiary organs, or those of rather secondary importance—those of animal life, as the liver, spleen, stomach, etc.

5th. That these causes proceed from all the circumstances that impair the purity of the air, which is essential to healthy existence, proceeding from vegetable and animal decomposition of all kinds, and disturbances of the original soil—that these, in the aggregate, constitute MALARIA, together with certain meteorological conditions, which are indispensable, to give it activity.

6th. That all we know of contagion, is, that being a specific virus, the product of secretory action, *it must be*, in its very nature, independent of all these circumstances and conditions; the existence and the spread of these can necessarily have no connection with it. But, as all the conditions productive of vitiated or bad air must tend to extend the above influences, within the area of that impure air, and in proportion to that impurity and the meteorological condition, so the susceptibility to the spread of these diseases will exist.

7th. The final proof of all these propositions is, that when the conditions above pointed out are removed, or no longer exist, the effects cease, *causa sublata tollitur effectus.*

Throughout this paper I have endeavored to impress the reader with the firm belief which has pervaded my own mind—that as there can be no effect without an adequate cause—so all fevers, and at the head of them particularly, yellow fever, must have some adequate cause for its production, and I solemnly entertain the firm and abiding conviction, that we are not ignorant of that cause. Our author attributes yellow fever to "accident or specific causes." The term "accident" may be applicable to man's action—but not to the Creator's—with him, be it reverently spoken, there can be no "accident." In its reference to us, it only means our ignorance of a cause. But herein I have shown that this is a most egregious error, and that we know as much of the cause of yellow fever, as we do of any other ailment with which man is afflicted, and that, moreover, there is nothing "specific" about it. Nay, it is not too much to hope, with the better understanding of climatology, with the clear proof, now well known to every well read medical man, that fevers of every class and type have their geographical limits, and this will be the more precise, as both of these are better understood, (i. e., fevers and climate,) that the great mystery of the proximate cause of fever, that is, the *ipse morbus*, will be, ere long, unravelled. To hasten that long coveted period, to make this of real practical value, (its only use) we must push on anew in our studies of climate and its relations, for it is upon a thorough understanding of all these, as a foundation, that we can erect any rational structure of sanitary and preventive measures. This study must enter into medical education in the legitimate orthodox way, through a proper system in the schools. Let it receive its earliest impulse from this first Sanitary Commission ever instituted in America to investigate the origin of epidemic diseases, and if we shall have succeeded "in establishing a single principle in our science"—we shall, in the language of our eminent countryman, Dr. Rush, "have done that which will lead to more truth in one year, than whole volumes of uncombined facts will do in a century."

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